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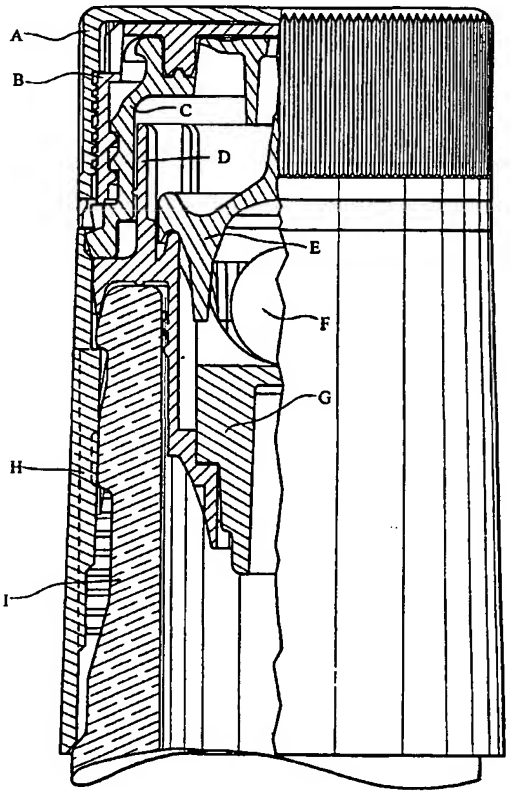
(54) Title: NON-REFILLABLE AND INVIOLABLE STOPPER FOR BOTTLES OR CONTAINERS



(57) Abstract: A non-refillable type of stopper for bottles of liquor that includes a cover, a tamper indicating type of closure, a threaded pourer device (c), a washer (D), two valves (EG), a glass sphere (F) and a cylindrical retaining sleeve (H). The closure has on its lower outer edge a tamper indicating ring (9) with a series of angular teeth (2A). This is caused by the angular teeth of the ring which fit against a series of teeth (24) angled in the opposite direction on the pourer preventing the rotation of the ring and fracturing a series horizontal webs, segments or bridges (20) that join the ring to the cap. The non-refillable device has a retaining sleeve (4) that joins the pourer by means of a snap fit, glue or ultrasound soldering. Further, the threaded cap has an on-stop feature (15, 37) to prevent the teeth of the tamper-indicating ring from being misaligned with the teeth on the base of the threaded neck device and provisions for sealing the container when the cap is so stopped.

WO 00/75033 A1

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NON-REFILLABLE AND INVIOLABLE STOPPER FOR BOTTLES OR CONTAINERS

TECHNICAL FIELD

The present invention refers to non-refillable closures for bottles or containers containing liquids such as alcoholic beverages that require an inviolable type of closure and a non-refillable mechanism that permits the exit of liquids from the interior of the bottle, but does not allow the entrance of liquids into said bottle.

BACKGROUND ART

There are currently on the market various designs of non-refillable or inviolable stoppers or models that combine these two characteristics that have some flaws which prohibit them from fulfilling their goal of guarantying to the consumer that the bottle is not refilled or the original liquid adulterated. It is the objective of the present invention to overcome these flaws and provide to the bottler a non-refillable closure that meets these requirements of having an inviolable screw-top, a mechanism that is effectively nonrefillable and a stopper that cannot be extracted from the neck of the bottle without destroying it or indicating it has been tampered with.

This objective is realized by the design of a non-refillable closure that guaranties, once inserted into the mouth or neck of the bottle, that it cannot be removed without detaching a lower tamper indicating ring on the screw top which separates into two parts, thus

making it evident that the top has previously been unscrewed or tampered with. The retainer sleeve on the exterior neck of the bottle can be of a different color which makes the lack of the ring more obvious.

Besides the objective of assuring an hermetic seal, a two piece top has been designed with a double seal that utilizes two concentric rings and a downwardly extending rod in the central part of the inner surface of the top wall.

Very important and necessary to make the stopper effectively nonrefillable is the design of a mechanism which incorporates an upper valve, a lower valve, a glass sphere, a washer or gasket and a pourer.

Finally, to ensure that the stopper cannot be removed from the bottle without destroying it, horizontal anchors have been designed in the interior of the retaining sleeve that is lodged beneath a band or circular cavity in the neck of the bottle. To avoid the extraction of the retaining sleeve, it has been molded with plastic resin that has a mollification temperature of over one hundred degrees Centigrade. Additionally, as an additional measure to prevent removal of the retainer sleeve, a special temperature sensitive chemical may be added to the anchoring tube. Thus if the tube is placed in a heated environment in an effort to remove the stopper, the chemical will be activated indicating exposure to such an environment.

DISCLOSURE OF THE INVENTION

The present invention refers to a particular design for the inviolable and non-refillable type of stoppers for liquid containers.

The characteristic of its non-refillable nature is achieved through a mechanism that consists of a washer, a lower and upper valve, a glass sphere located between the two valves,

a pourer and a retaining sleeve. This mechanism permits the flow of liquid in one direction but prohibits its flow in the opposite direction. When pouring the liquid by inverting the container, the valves separate from their seated position, and when trying to refill the bottle the valves block access to the interior of the bottle by resting against the washer valve seat.

The invention is characterized by a non-refillable mechanism that consists of a lower valve located in the lower part of the washer, a glass sphere that is situated within the interior of the lower valve, and an upper valve that mates with the lower valve and retains the glass ball in a retained position between the two. This combination of valves is very effective in the prevention of liquids entering the interior of the bottle and allowing liquid to flow out when the valves and glass sphere are displaced such as when the bottle is tipped to pour out its contents. When in a vertical position the lower valve is seated on the annular valve seat of the washer owing to the weight exerted on the lower valve by the glass sphere. A series of small vertical segments or ribs on the lower part of the washer retain the lower valve in centralized position and inhibit its displacement on the vertical axis. Therefore, to pour the liquid from the bottle, the lower valve is displaced when the liquid impacts a central cavity on the bottom surface of the lower valve, achieving the displacement of this valve and the upper valve from their position and permitting the flow of liquid there through.

The non-refillable mechanism has an upper valve that is located in the upper part of the washer that serves to block access to the interior of the bottle through a valve seat. When the liquid is poured (the container is inverted) the upper valve separates from the washer as the glass ball hits the lower interior surface of the upper valve.

The upper valve has depending below its lower surface a series of teeth that mesh with another set of upwardly directed teeth on the lower valve, the objective being the rotation of

the lower valve if the upper valve is made to rotate. The reason that the valves would rotate as the screw cap is unscrewed would be to break contact with the valve seat of the upper and lower valve and the washer. The sticking of the valve seats can inhibit the displacement of the valves, especially when the liquid contains sugar or some other material that tends to stick to the surfaces.

The non-refillable stopper has two locking surfaces to avoid the exit of liquid when the closure is threaded in place onto the container. One of the locks is achieved by means of one or various depending concentric rings that are introduced into the upper cavity of the pourer blocking the exit opening. The other lock is achieved by means of a concentric rod on the interior surface of the top wall of the closure inner cap. This rod is introduced into the interior of the pourer through a central cavity by screwing the stopper into place, the lower part of the rod, which ends in a crosspiece, is introduced into a conical cavity on the upper valve. The rod pushes the upper valve against the washer and valve seat, thereby blocking the exit of the liquid through the washer. The rod also has the objective of making the valves rotate when the closure is unscrewed owing to the fact that the crosspiece is introduced into the conical cavity of the upper valve and turns the valve as the screw cap is turned.

The threaded screw cap or closure has on its exterior lower depending wall a tamper indicating band or ring that has a series of inwardly directed angular teeth that serve to permit the application of the top without fracturing while at the same time inhibiting the rotation of the ring when the top is screwed off. This is effected by the teeth that set up against a series of angular teeth on the lower exterior surface of the washer. The ring is joined to the body of the stopper by means of a series of horizontal segments or bridges which break the union of the ring to the body of the outer cap and cause the detachment of the ring when the ring does

not turn as the cap is unscrewed. The tamper indicating ring may have two vertical cuts separated by one-hundred-and-eighty-degrees that cause the ring to break into two pieces as the ring is separated from the body of the stopper.

An outer cap tops the external part of the threaded closure which holds the inner cap in place by means of horizontal ribs on the inside of the outer cap. These interlock with other horizontal ribs on the outside of the inner cap. The inner cap has been designed with a circular, grooved surface which fits with the grooved surface that the inner surface of the outer cap.

Since it is necessary that the closure or top always screws on in the correct position in relation to the pourer, there have been placed at a distance of one hundred and eighty degrees apart two bumps on the upper surface of the pourer which fit with two similar markings on the upper interior surface of the top. The result of these bumps is the correct positioning of the teeth of the tamper indicating ring so that when the top is screwed on for the first time they are positioned in between the teeth of the pourer and cause the breakage of the horizontal segments or bridges that join the tamper indicating ring to the body of the top upon the first unthreading of the threaded closure top.

A retaining sleeve that forms the lower exterior cylindrical part of the stopper is snapped, glued or soldered by ultrasound to the lower part to the pourer.

The retaining sleeve has on its interior cylindrical surface a series of angular horizontal ribs or anchors that allow the sleeve to slide over the neck of the bottle and lodge itself beneath an outwardly extending circular band on the neck of the bottle and thereby avoid the removal or movement of the sleeve when trying to take it off the bottle. The sleeve additionally has on its interior cylindrical surface a series of vertical ribs that fit against

certain notches or vertical grooves on the neck of the bottle which impedes rotation of the sleeve.

BRIEF DESCRIPTION OF THE DRAWINGS

The novelty of the present invention will be better understood making reference to the description of the pieces along with the attached illustrations, in which:

Figure 1 is a partial cross-sectional view of the non-refillable and inviolable stopper of the present invention assembled with all its parts, presented on the neck of a bottle or container;

Figure 2a is a bottom view of the closure overcap of Figure 1;

Figure 2b is a partial cross-sectional view of the overcap of Figure 1;

Figure 3a is a bottom view of the threaded inner cap of Figure 1;

Figure 3b is a partial cross-sectional view of the threaded inner cap of Figure 1;

Figure 4a is a partial cross-sectional side view of the pourer of the present invention;

Figure 4b is a top view of the pourer of Figure 4;

Figure 5a is a partial cross-sectional side view of the washer of the present invention;

Figure 5b is a top view of the washer of the present invention;

Figure 6a is a partial cross-sectional side view of the upper valve of the present invention;

Figure 6b is a top view of the upper valve of the present invention;

Figure 7a is a partial cross-sectional side view of the lower valve of the present invention;

Figure 7b is a top view of the lower valve of the present invention;

Figure 8a is a sectional side view of the retainer sleeve covering of the present

invention;

Figure 8b is a bottom view of the retainer sleeve covering of the present invention;

Figure 9a is a partial cross-sectional side view of the neck of the bottle of the present invention;

Figure 9b is a top view of the neck of the bottle;

Figure 10 is a sectional side view of an alternative embodiment for the present invention having a one way valve design with a center support post for the lower valve;

Figure 11 is a sectional side view of an alternative embodiment of the present invention for the upper valve having an upwardly extending stem for visual verification;

Figure 12 is a sectional side view of an alternative embodiment of the present invention for the lower valve;

Figure 13a and 13b are sectional side views of an alternative embodiment of the present invention for the lower valve seat;

Figure 14 is a sectional side view of an alternative embodiment of the present invention for the threaded inner-cap and upper valve of the present invention;

Figure 15 is a sectional side view of an inner seal device for use with the present invention;

Figure 16 is an alternative embodiment for the pourer and inner cup for the present invention;

Figure 17 is an exterior side view of the tamper indicating exterior outer wrap for the present invention;

Figure 18 is a perspective view of an alternative embodiment for an on-stop feature used in combination with the non-refillable closure of the present invention;

Figure 19a-19g are alternative embodiments for sealing features combined with on-stop features of the present invention; and,

Figure 20 is an alternative embodiment of a snap on over cap used with an inner cap having a tamper indicating ring for use in combination with the non-refillable closure of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring to Figure 1, the following can be viewed in their assembled position: the closure over cap "A"; the inner cap "B"; the pourer "C"; the washer "D"; the upper valve "E"; the glass sphere "F"; the lower valve "G'; the retaining sleeve "H'; and the neck of the bottle or container "I".

In Figure 2b you can see the closure overcap "A" which has a vertical wall 1 which can have on its exterior surface a series of grooves or knurls 3 to better handle or turn over cap "A". On the interior upper part 2 of the vertical wall there have been placed a series of vertical knurlings to mesh against another series of vertical knurlings 14 on the threaded closure inner cap "B" on the upper exterior part of the vertical wall 6, shown in Figure 3b, with the object of mating the rotation between the over cap "A" and the threaded inner cap "B".

On the interior middle part of the vertical wall 1 of the closure over cap "A" have been placed a series of horizontal beads or ribs 4 which fit against similar grooves 7 on the vertical wall 6 of the threaded closure inner cap "B" with the objective of keeping closure over cap "A" tight on the threaded closure inner cap "B". The closure over cap "A" has a horizontal cylindrical surface 18 that serves to properly position threaded closure inner cap "B" when it is in contact with the horizontal cylindrical surface 23 of the threaded closure inner cap "B".

The depending vertical wall 1 of the closure over cap "A" ends in a horizontal ring 5 which makes contact with the upper part of the tamper indicating ring 9 of threaded closure inner cap "B" when it is assembled to said closure inner cap "B". The vertical wall 6 of the threaded closure inner cap ends in its upper part in an angle 16 to facilitate the assemblage into the closure over cap "A".

The threaded inner cap has a vertical wall 6 which has on its interior surface at least one thread 8 which serves to screw the threaded inner cap "B" onto the pourer "C" having matching threads 31, shown in Figure 4.

In the lower portion of threaded inner cap "B" appears a tamper indicating ring 9 joined to the body of the threaded inner cap "B" by means of a plurality of webs 19, shown in Figure 3a. These webs 19 make contact with the wall 6 by means of a series of small bridges 20 which break as the inner cap "B" is unscrewed for the first time from the pourer "C". This occurs by means of a series of angular teeth 21 located on the interior wall of the tamper indicating ring 9, increasing the thickness of wall 22 and which fit against another series of angular teeth 24 in the opposite direction on pourer "C" which are angled to prevent the rotation of ring 9 when threaded inner cap "B" is unscrewed. This non-rotation of ring 9 in the counter clockwise direction causes the bridges 20 to break which separates ring 9 from the wall 6. Ring 9 can be separated in two or more parts.

Since it is necessary to correctly place the angular teeth 21 of the threaded inner cap "B" in relation to the angular teeth 24 of the pourer "C" there has been designed on the upper interior part of the threaded inner cap "B" a thread or stop 15 that limits the rotation of the inner cap when positioning it on the pourer "C". This on-stop feature utilizes thread stop 15 in conjunction with the angled stop member 37 on the pourer and prevents the teeth 21 and 24

from being teeth on teeth when the closure is threaded on the pourer "C". Over-threading of the closure onto the pourer may cause this ratchet on ratchet condition which could enable the closure "B" from being unthreaded from the pourer "C" without detachment of the tamer indicating band 9. The thread stop thus prevents continued rotation of the closure onto the pourer and forces the ratchet teeth 21 and 24 to be properly positioned. The thread stop 15 and member 37 are therefore in such a position to guarantee the positioning of the ratchet teeth upon full application of the closure on the pourer.

On the inner surface of the top wall 17 of threaded inner cap "B" shown in Figure 3b, an annular depending sealing ring 12 is shown which ends in one or more sealing ridges 13 that serve to produce an hermetic seal when they are introduced into one or more of the annular cavity 36 on the pourer "C", Figure 4a. This annular cavity is formed by the ring and the circular horizontal wall 34 and after threading of the closure the ring blocks the exit orifice 36 of the pourer "C". Also on the interior part of the top wall 17 of the cap "B" is shown a circular depending rod 10 which ends in a crosspiece 11 that is introduced into the interior of the pourer "C" through the central circular orifice 41. This permits crosspiece 11 to be introduced into the circular conical cavity 65 of the upper valve "E", Figure 6b, on the upper part of the cylinder 66. The vertical key 68 causes valve "E" to turn when threaded inner cap "B" is unscrewed. The rotation and lifting of upper valve "E" is also assisted by the fact that the circular cavity 65 has a conical vertical wall that exerts pressure on the crosspiece 11 of the threaded inner cap "B".

Turning to Figure 4a and 4b, the circular horizontal top wall 40 of the pourer "C" has a depending annular wall 42 which has the objective of guiding the vertical displacement of the upper valve "E" (see Figure 6a) thereby limiting the lateral movement of the upwardly

extending cylinder 66 of the upper valve. The vertical movement of upper valve "E" is limited when the upper circular surface of 66 makes contact with the surface or circular wall 40 of the pourer "C".

The surface or pouring lip 38 of the pourer "C" has on the interior wall a curve or angle 39 that has the objective of cutting off the flow of liquid when it is poured and to avoid drainage down or over the exterior of the pourer "C".

To fasten the depending annular wall 42 of the pourer "C" a series of vertical spokes 33 have been provided to make contact with the interior of the depending wall 32. On the inner surface of the depending wall 32 of the pourer "C" an annular depression 30 has been placed which receives a horizontal ridge that the washer "D" (Figure 5a) has on the side wall 46, avoiding that separation of the pourer "C" from the washer "D" when both pieces are assembled.

The annular base seat 29 of the pourer "C" limits the vertical movement of the washer "D" when it makes contact with the vertical ribs 48. The circular base surface 27 of the pourer "C" also limits the movement of the washer "D" into pourer "C" by contacting the depending annular ridge 51 of the washer "D". The annular base 25 of the pourer "C" has an angular side wall 26 which joins the circular surface 88 and the ring 87 of the retaining sleeve "H" by means of glue or ultrasound soldering.

In reference to washer "D" of Figure 5a and 5b, the washer has on its upper cylindrical side wall 46 a first set of vertical ribs 45 which guide the vertical movement of the upper valve "E" and which permits the flow of liquid between the two. These vertical ribs 45 end at their upper ridge in a downward angle 43 to facilitate the introduction of the upper valve "E" to the interior of the washer "D". The washer "D" also has an inner annular lip 49 which

serves as a seat for the upper valve "E" when making contact with the annular valve seat 69 of the upper valve effectuating an hermetic seal when valve "E" receives vertical downward pressure from the rod 10 of the threaded inner cap "B". This pressure also serves to size the valve seat which may be distorted due to molding or insertion of "D" into the walls "I". The horizontal circular surface 53 of the washer "D" has at least one circular knurlings 52 which, when in contact with the horizontal circular surface 100 of the bottle "I", helps effectuate an hermetic seal between both pieces (see Figure 9a and Figure 1).

The depending annular ring 51 of the washer "D" is angled inwardly with the objective of facilitating the assemblage of the washer "D" when introducing it into theretaining sleeve "H". The depending annular wall 54 of the washer "D" has on its exterior wall a series of horizontal ridges 56 that make an hermetic seal with the bottle "I" when in contact with the interior wall 103 as is shown in Figure 1.

The washer "D" has a second series of vertical ribs 55 that guide the lower valve "G" in its vertical movement and permit the passage of the liquid between these vertical segments 55 and the lower valve "G". The vertical ribs 55 end at their upper part in an angle 50 to facilitate the introduction of the lower valve "G" (See Figure 7a) into the interior of the washer "D".

The washer "D" has a lateral seal with lower valve "G" when the interior vertical surfaces 57 and 60 of the washer "D" are in contact with the vertical surfaces 78 and 81 of the second lower valve "G". A seal between the washer "D" and the first and second valves ""E" and "G" is also effectuated when the horizontal valve seats 49 and 59 of the washer "D" are in contact with the corresponding horizontal valve seats 69 and 83 of the valves "E" and "G".

The liquid flows from the interior of the bottle "I" through the orifice 73 of the washer

"D" when valves "G" and "E" are displaced during inclination of the bottle "I". The liquid flows through the spaces between the vertical ribs 55 and 45 of the washer "D" and through the orifice 36 of the pourer "C".

The upper valve "E" of Figure 6a and 6b has an annular surface 67 which guides the vertical displacement of the valve "E" by the vertical ribs 45 of upper side wall 46 of the washer "D". The upper side wall 46 of washer "D" has an outside diameter almost equal to the interior diameter of the side wall 32 of the pourer "C" effectuating an hermetic seal when these two pieces are assembled.

Annular surface 67 of the upper valve "E" has been designed to guide the valve "E" and effectuate a seal between the valve "E" in the washer "D" when the conical surface 69 is in contact with the inside top corner of ring 49 of the washer "D".

On the depending section of the upper valve "E" is located a series of depending teeth 71 that have the objective of limiting the lateral movement of the glass sphere "F" shown in Figure 1. The teeth mesh with a series of upwardly extending teeth on the lower valve "G" making valves "E" and "G" turn when threaded inner cap "B" is unscrewed. Rotation of valve "E" is transferred to valve "G" when the crosspiece 11 is introduced into the conical keyed cavity 65 and the vertical teeth 71 and 76 mesh causing the breakage of the possible adherence between the valve seats of "E" and "G" and the washer "D".

The lower interior part 72 of the upper valve "E" has a semi-spherical form to accommodate the glass sphere "F" in its interior when it is displaced as the liquid is poured from the interior of bottle "I".

The teeth 76 of the lower valve "G" in Figure 7a and 7b have a lateral wall 75 which line up against the teeth 71 of the valve "E" when the threaded inner cap "B" is unscrewed

from the pourer "C". The bottom portion 74 of the teeth 76 has a circular form. The glass sphere "F" lodges itself between these vertical segments, limiting its lateral movement since these teeth 76 are projected above valve "G" with a radial surface 77 that centers the glass sphere "F".

The upper body of the lower valve "G" is formed by a cylinder 79 that has an exterior vertical surface 78 which limits the lateral movement of the valve "G" when in contact with the vertical ribs 55 of the washer "D". On the lower part of the cylinder body 79 of the lower valve is located a horizontal valve seat 83 which, on contact with the valve seat 59 of the washer "D", effectuates a seal between the valve "G" and the washer "D" when pressure is exerted on valve "G" by the weight of the glass sphere "F". The lower part of valve "G" is formed by a vertical cylinder 82 having a smaller diameter than cylinder 79 and which causes a lateral seal when the outer surface 81 is in near contact with the vertical cylindrical surface 57 of the washer "D". The vertical cylinder 82 of the valve "G" has on its lowest portion a horizontal cylindrical surface 83 that contacts ribs 62 to maintain its centralized location within washer "D".

The retaining sleeve "H" of Figure 8a and 8b has a side wall 89 having in the interior a series of anchors 91 formed by the inner angular surfaces 92 and 93 and also the outer angular surface 90. Retaining sleeve "H" holds the entirety of the stopper withi bottle "I" as can be seen in Figure 1. The pourer, washer, upper and lower valves are held into place by the upper portion 88 of the sidewall. When the sleeve is attached to the bottle "I" the surfaces 92 and 93 slide on, facilitating the positioning of the anchors 91 beneath the circular horizontal surface 104 of the bottle "I" shown in Figure 9a. Since the anchors 91 have a diameter slightly larger than the diameter of wall 105 and smaller than 102b the bottle "I", the

vertical movement of the sleeve "H" is prevented. The surfaces 90 of the sleeve "H" are maintained in close contact with the angular surface 102a of the bottle "I", avoiding the movement of the sleeve and all interior parts of non-refillable closure once it has been placed on the bottle "I".

To impede the rotational movement of the sleeve "H" with respect to the bottle "I" a series of vertical ribs 95 and 94 has been provided in the interior wall 89 of the sleeve "H", which are located between the vertical segments 107 of the bottle "I", lining up and avoiding the rotational movement of cylinder "H". The lower part of the vertical ribs 94 and 95 end in an angle 96 to guide these vertical ribs and position them between the vertical ribs 107 of the bottle "I".

To initiate the correct positioning of the sleeve "H" on the bottle "I" small vertical ribs 97 have been designed. The lower part of the side wall 89 ends in angle 98 so that when the sleeve is placed on the bottle "I" it remains above an angular surface 108 on the neck of the bottle "I". To facilitate the positioning of the sleeve on the neck of the bottle "I", the upper cylindrical part 106 ends in two angled surfaces 99 and 101.

A problem sometimes arises wherein slight tilting of the container "I" may unseat the lower valve "G" from the washer "D" and allow refilling of its contents. To prevent this, as shown in Figure 10 an alternative design for the lower valve 121 is shown. Washer 120 has annular valve seat 125 which mates with annular valve seat 126 of the lower valve. As in the first embodiment, when the lower valve and the washer are in the shown alignment of Figure 1, fluid may not be inserted through the lower valve and into the container as the only pathway is through the adjacent valve seats. Downward pressure from a glass ball or the like positioned in the interior 127 of lower valve 121 forces the valve seats to be adjacent to one

another thereby providing a tight seal. Alternatively, when the container is turned upside down or tilted, lower valve 121 moves upward allowing the flow of liquids through holes 128. In this embodiment, the lower valve has extending downward from its bottom surface an alignment post 122. Alignment post 122 extends downward through the lower section of the washer 120 and through aperture 124 formed through the bottom wall 123 of washer 120. Central post 122 ensures that the lower valve 121 is properly stabilized and centered on the valve seat 125 such that the valve 121 will not become displaced when the bottle and hence the non-refillable closure is turned at a slight angle.

In order for the user of the package, to determine the proper working and vertical displacement of the valves, Figure 11 shows an additional embodiment wherein the upper valve 131 protrudes through an aperture 132 in the pourer 135. The valve stem 130 extends upward a longer distance than in the prior design shown in Figure 6a. The valve stem 130 has at its top most end a hole 134 for receiving the downwardly extending stem 133 from the interior top wall of the threaded closure cap. When the bottle is turned over for the fluid to exit through the valve and through flow holes 136, the upper valve moves vertically such that the stem 130 protrudes through the pourer 135 providing a visual indication to the user that the valve 131 is working correctly.

In a further design modification, prevention of transferring the contents of one package to another through the shaking of the device may be accomplished through the use of a lower valve 143 having a single annular ridge 142 as is shown in Figure 12. In this design, the lower valve 143 contacts an annular ridge 142 on the washer 145. The lower valve 143 has a downwardly extending portion 140 which has on its lowest sidewall an outwardly extending point 144 which is close but does not touch the downwardly extending wall 146 of

the washer. Therefore, having only a single point of contact at the ridge 142 between the valve 143 and the washer 141 allows the lower valve to move without sticking. Also, valve 143 may be flexible so as to provide sufficient seal around bead or ridge 142 but also so as to overcome the saddle shape ridge 142 may cause should the container bore be out of round. The horizontal distance between the circular wall 146 and the point 144 may be very slight such that a slight seal is made between the two surfaces without providing a distinct contact point. Further, the point 144 may be removed along with the downwardly extending wall 146 of the washer providing a secondary option indicated in the right side of Figure 12 wherein the distance between the lower annular wall 141a shown in the Figure 12 and the lowest annular surface 140a of the valve like 140 on the left provides a check valve such that the valve must move a predetermined vertical distance before a large quantity of product can pass through the valve. This distance may vary depending on the height of wall 147 thereby requiring before flow of liquid that the lower valve be unseated vertically from the washer 141 a predetermined distance provided by the length of wall 147. This predetermined distance may maximize the effectiveness of the non-refillable closure and prevent the refilling of the container through shaking or by other means.

An improved check valve may be added to the lower valve to insure an adequate sealing of the lower valve and the washer. As shown in Figures 13a and 13b, an annular stop 152 may be placed on the washer 151 when used in combination with a thin flexible sealing fin 153. The sealing fin 153 provides a first sealing mechanism between the washer 151 and the valve 150. As a secondary sealing means, a stop 152 may be placed on the washer and extend upwardly therefrom for contacting the lower annular surface 155 of the valve 150. Alternatively, a downwardly extending stop 154 may be provided on the outer periphery of

the annular valve 150 as is shown in Figure 13b. The stop on the washer 151 or on the valve 150 limits the compression of the sealing fin 153 during assembly or may additionally aid in maintaining a proper seal if pressure is used to try to force liquid past the check valve.

An additional problem with these types of non-refillable closures deals with the proper sealing of the device when the cap is fully threaded onto the pourer to a rotational stop, particularly when individual component manufacturing tolerances are considered. Potential leakage may be remedied by the embodiment shown in Figure 14.

As shown in Figure 14, a non-refillable closure with a tolerance flex feature is provided wherein a flexible inner cap 160 has a top wall which may flex slightly upward to provide pressure through the stem 161 onto the concave upper valve 162. The upper valve 162 has a flexible annular surface 163a which is shown in Figure 12 on the left side prior to downward pressure being applied from the screw cap. Upwardly extending wall 164a of the washer contacts the annular surface of 163a such that an upward bend on the annular surface will result upon downward threading of the cap 160. The annular surface 163b is shown on the right portion of Figure 14 with a pressure fit against the slightly deformed wall 164b of the washer after the cap is fully threaded. Allowing for flexing in the upper valve 162 through surface 163a or in the sidewall 164b of the washer or the cap top 160 insures that an adequate seal is provided despite minor tolerances in the manufactured process.

In order to provide an additional or alternative indication of tampering to the non-refillable closure, an inner seal device may be provided against the pouring lip 172 of the pourer 174. This inner seal device 170 may have a tab 171 which the user may peel back in order to remove the circular sealing disc or washer 170. Additionally, the tab may be provided with an aperture 173 centrally located therein in order to allow the downward extending stem of

the screw cap into the upper valve 176 and place pressure thereon as shown in the prior embodiments. The inner seal 170 may contact the pourer 174 along its annular pouring lip 172 and may be adhered thereto through induction bonding or the like. Thus, upon first use and in order to indicate prior tampering with the interior of the container, the inner seal 170 must be removed from the pouring lip 174 before any of the contents may be dispensed. In order to provide an adequate seal between the pourer 181 and the threaded cap 180 as is shown in Figure 16, a bendable flange 182 may be provided on the upper surface of pourer 181 in order to properly seal the top interior wall 183 of the screw cap with the pourer 181. This flange 182 provides an adequate seal between the pourer and the closure such that a pliable seal is provided insuring that no contents of the container spill between the closure 180 and the pourer 181 and into the threaded area there between. Liquid contents in this threaded area may eventually disburse along the exterior of the container and is highly undesirable. The flange 182 may be molded in an upward position and may be bent as shown in Figure 16 by an assembly mandrel or upon threading of the closure onto the pourer during the assembly manufacturing process. The force of the threading procedure for placement of the closure on the pourer thereby provides the adequate pressure to bend the flange 182 and provide an adequate seal between the pourer 181 and the bottom interior surface 183 of the threaded cap 180. After unthreading of the overcap, flange 182 may return to its upward angle thereby acting as a pouring lip.

An additional problem in tamper indication of the non-refillable closure is the removal of the non-refillable valves in a heated environment. Due to the fact that the retainer sleeves or the valves themselves are made of a thermo-plastic resin, heating may make them sufficiently pliable in order to remove them from the neck of the container. Under normal

environmental conditions, removal of the sleeve from the container neck causes fracturing of the thermo-plastic resins constituting the retaining sleeve thereby indicating tampering. However, upon heating of the material, it may be possible for a user to remove the valves from the container without any indication of tampering. One alternative to prevent such an occurrence is to place a heat indicating ink or other chemical in the retainer sleeve 190 or on the exterior thereof such that if the retainer sleeve is placed in this heated environment a proper warning or other indication 191 is shown as seen in Figure 17. Thus if the container neck is heated to a predetermined temperature, tamper indication may be visible by writing with heat sensitive ink in the form of void or other color indicator. This will alert the user that the closure has been previously tampered with and that the contents may not be guaranteed.

An additional preventive measure for heating and removal of the non-refillable closure from the container is placement of a heat-resistant glue along the horizontal surface 53 of the washer "D" shown in Figure 5a. This type of adhesive would thereby prevent removal of the washer from the bottle by submerging the nonrefillable closure in heated water. Removal of the washer after application of this adhesive would cause visible damage to the washer thereby indicating tampering with the contents.

One design for an on-stop feature discussed herein is more clearly shown in Figure 18 wherein the container 200 is provided with a stop mechanism 203 which controls the location of the ratchets 205 in relation to the ratchets 202 on the container neck. As can be seen from figure 18, the stop 206 formed on the bottom edge of the closure 201 directly contacts the stop 203 such that stop 203 will not impede the threading off of the closure but will prevent continued clockwise rotation when the stops 203 and 206 are engaged. Ratchets 205 and 207

are therefor properly located in between ratchets 202 on the container neck. Ratchets 205 are located on the interior surface of the tamper indicating band 207 which is fractured upon first removal of the closure 201 from the container 200. As the stops 203 and 206 prevent continued rotation of the closure 201 on the container threads 204 during application of the closure, a seal may be provided such as shown in Figure 19 or Figure 14, feature 160a, which depends below the top wall of the closure 201 and plugs into the interior neck of container 200 or pourer 39a. This plug seal should work over the height range of the on stop feature in order to make sure that the closure equally prevents contents of the container from dispersing after rotation of the closure is discontinued.

Figure 19 details a pourer and cap combination of a seal and on stop feature wherein in Figure 19a plug seal 211 depends below the closure 210 top wall and compresses against the side wall of the pourer and cap combination. Alternative forms of this seal are shown in Figure 19b and 19c wherein an inwardly directed bead 212 contacts the upper most outer surface of the side wall of the container pourer and cap combination and further, in Figure 19c an outwardly extending bead 213 contacts the upper most interior surface of the closure side wall. These different embodiments ensure that an adequate seal is provided between the closure and the container or pourer and can be designed to be effective along the entire length of any possible vertical variation caused by the on stop features.

In Figures 19d, 19e, 19f and 19g , alternate variations are provided for the on stop feature wherein Figure 19d details use of a lug 214 formed on the exterior neck of the container or non-refillable pourer assembly below the bottom edge of the closure 210. A mating depending lug 215 is provided on the lower edge of closure 210 so as to contact the on stop lug on the container or non-refillable pourer assembly and prevent continued rotation of

the closure 210. Alternatively, in Figure 19e, lugs 217 and 216 may be formed on the interior edge of the assembly and closure. The vertical rib or lug 216 on the lower portion of the closure 210 contacts a similar lug or stop 217 formed on the bottom neck of the container preventing clockwise rotation of the closure on the container. In Figure 19f, similar lugs or stops 219 are formed on the upper interior edge of the closure at a position above the threads (also shown in Figure 3, item 15). These similarly contact stop 218 or item 37 in Figure 4 near the mouth of the container or pourer assembly preventing the rotation of the closure on the container once they are adjacent to one another. Lastly, Figure 19g details use of the thread 222 on the interior of the closure which has blunt end 221. End 221, upon fully threading the closure onto the container abuts stop means 220 formed below the matching threads on the container neck or pourer assembly. The mating lug or stop means on the container and closure may be back angled so as not to form a direct ninety degree angle, i.e. they are each less than ninety degrees in relation to the inner most wall the lug is connected to. This causes the mating lugs to pull together to tighten and stop with more control due to the angle of the opposing stops. All of these embodiments effectively prevent over-rotation or misalignment of the teeth or ratchets on the container or pourer assembly and the closure.

Finally, as shown in Figure 20, the inner cap 231 and the outer cap 230 may be assembled in a secondary separate step so that the inner cap containing the tamper indicating ring 232 may be installed without the problems of previous tamper indicating web breakage caused by applying a pre-assembled outer cap and inner cap. The inner cap 231 is first manufactured and applied to the container such that the TI band 232 is left above the continuous bead 237. Applying the inner cap so modified to the pourer or neck prior to application of the outer cap removes any interference between the mating tamper indicating

ratchets when threading on of the inner cap 231. After threading on of the inner cap 231 as indicated, the outer cap 230 can be snapped onto the inner cap forcing the inner cap TI band downward and over the bead 237 or past the ratchets. Outer ribs 233 and 234 engage inwardly directed beads 235 and 236 retaining the outer cap onto the inner cap. This design feature allows the webs attaching the inner cap to the TI band to be more fragile then previously needed since it prevents premature breakage of the webs as the inner cap is threaded onto the container. The ratchets must bump past one another or the rotary friction of the TI band bead passing the finish or pourer retaining bead.

PLASTIC MATERIALS USED

The pieces that form the stopper are molded from plastic resins determined by their physical characteristics to carry out the proper function required. Sleeve "H" is molded with a plastic resin with a high mollification temperature, such as polycarbonate, with the objective of avoiding removal of the stopper from the bottle "I" through the use of heat. The pourer should be molded with a resin that has a fusion temperature very similar to that of sleeve "H" when these pieces are joined by ultrasound.

ASSEMBLY OF THE CLOSURE

The assembly of the non-refillable closure is effectuated by making preliminary steps and one final assembly step. The inner cap is pre-assembled within the outer cap. The non-refillable mechanism is pre-assembled by placing the lower valve inside the washer, then the glass sphere and subsequently the upper valve, and finally pressure is used to attach the pourer into the washer. The final assembly takes place when the non-refillable mechanism is adhered to the retaining sleeve using glue or ultrasound soldering, and then screwing the combined inner and outer cap to the pourer.

CLAIMS

1. A non-refillable one-way stopper for a containers comprising:

a washer (D) fit within the neck of a container;

a threaded pourer (C) circumscribing and affixed to the upper end of said washer;

a one-way valve (E,F,G) retained within said washer and a pourer vertically movable, said one-way valve therein having an interlocking upper valve member (E) and lower valve member (G);

a retaining sleeve (H) which overwraps said container and retains said washer and pourer in place;

a closure (A,B) threadably retained on said pourer,

wherein said pourer and said closure has on-stop means for correct positioning of said mating teeth on said tamper indicating band and said pourer.

2. The stopper of claim 1 wherein said on-stop means is comprised of a thread stop (15) formed along the upper interior wall of said closure and a stop member (37) formed on the upper edge of said pourer.

3. The stopper of claim 2 wherein said pourer has an outwardly extending pouring lip (38), said stop member on said pourer is comprised of vertical stops (37) formed 180 degrees apart on said pouring lip above said threads.

4. The stopper of claim 3 wherein said thread stop on said closure is further comprised of a first and a second square face (15) contact stop 1801 apart formed along the co-joining side (7) wall (17) and top wall of said closure.

5. The stopper of claim 1 wherein said upper valve (E) is further comprised of a plurality

of downwardly extending fingers (71) and said lower valve (G) is further comprised of a plurality of upwardly extending fingers (75) interlocking with said fingers of said upper valve.

6. The stopper of claim 5 further comprised of a circular weight (E) retained within the fingers of said upper and lower valve.

7. The stopper of claim 6 further comprising a downwardly extending notched stem (10) extending downwardly from said closure which extends into said pourer.

8. The stopper of claim 7 wherein said stem (10) extends into a notched receptacle (64) formed on said upper valve member.

9. The stopper of claim 1 wherein said washer is further comprised of an inner annular lip (49) which extends upwards in the interior of said washer, said inner annular lip (49) acting as a valve seat for said upper valve member.

10. The stopper of claim 9 wherein said washer is further comprised of a first (49) and a second (59) lower valve seat, said first and second lower valve seat contacting a first (69) and second (83) valve seat located on said upper and lower valves.

11. The stopper of claim 1 wherein said pourer is further comprised of a circular horizontal top wall (40) and an annular wall (42) depending therefrom, said top wall connected to the side wall of said pourer by a plurality of spokes (33).

12. The stopper of claim 11 wherein said washer further comprises an upper cylindrical sidewall (46), an annular base portion (51) and a depending annular wall (54) extending downward therefrom.

13. The stopper of claim 12 wherein said upper cylindrical sidewall has a first set of vertical ribs (43) on the interior wall thereof and further wherein said depending annular wall

has a second set of vertical ribs (55) on the interior wall thereof, wherein said first set of ribs laterally retains said upper valve member and said second set of ribs laterally retains said lower valve member.

14. The stopper of claim 11 wherein said upper valve member has an upwardly extending cylinder (66), said cylinder retained within said depending annular wall (42) of said pourer.

15. The stopper of claim 12 wherein said depending annular wall (54) has at least one outwardly extending ridge (56) to contact the interior side wall of said container.

16. The stopper of claim 1 wherein said closure is further comprised of an inner cap (B) and an outer cap (A), said inner cap fixedly retained within said outer cap.

17. The stopper of claim 16 wherein said inner cap has a top wall and a depending annular sidewall (6) and is further comprised of a tamper indicating band (a) frangibly attached to the lower end of said side wall and further, said tamper indicating band and said pourer having mating ratchets (21, 24)such that upon unthreading of said closure from said pourer, said tamper indicating band is removed from said closure.

18. The stopper of claim 1 wherein said lower valve has a downwardly extending vertical surface (60) which extends through an aperture (73) in the bottom of said washer, said upper and lower valve moving vertically within said washer and said pourer.

19. The stopper of claim 1 wherein said pourer has an aperture (41) centrally formed on the top wall (40) thereof, said upper valve member having an upwardly extending stem (66) extending through said aperture when said container is in the inverted position.

20. The stopper of claim 19 wherein said washer has an upwardly extending annular valve seat (49) contacting said upper valve member and further has an vertically extending rib members (43, 44) retaining the lateral displacement of said upper and lower valve.

21. The stopper of claim 1 wherein said washer has a depending annular wall (145) extending into the neck of said container, and an annular base (141) extending inwardly therefrom and further having a lower depending annular wall (146) extending from said base (141) said base having an upwardly extending annular ridge (142) circumscribing said base (141).

22. The stopper of claim 21 wherein said lower valve member (143) has an outwardly extending bead (144) directed towards said lower depending annular wall (146) of said washer.

23. The stopper of claim 21 further having an inner sealing fin (153) between said annular ridge (152) and said lower depending annular wall.

24. The stopper of claim 1 wherein said pourer has a deformable annular lip (182) extending upward from the uppermost surface above said threads.

25. The stopper of claim 1 wherein said retaining sleeve has a heat sensitive ink contained therein.

26. The stopper of claim 1 wherein said closure has a circular top wall and a depending side wall, said side wall having on the interior side at least one triangular shaped ratchet (206), said pourer further having a flat annular surface below said threads, said flat annular surface having a mating ratchet (203) for contacting said ratchet on said closure.

27. The stopper of claim 26 wherein said closure further comprises a tamper indicating band (207) depending below said depending side wall.

28. The stopper of claim 1 wherein said closure further comprises a sealing mechanism between said closure and said container.

29. The stopper of claim 28 wherein said sealing mechanism is comprised of a plug seal

depending downward from an interior wall of said closure and compressing against said neck of said container.

30. The stopper of claim 28 wherein said sealing mechanism is comprised of an inwardly directed bead on said closure contacting an upper most annular edge of said neck of said container.

31. The stopper of claim 28 wherein said sealing mechanism is comprised of an outwardly directed bead located on an upper most annular edge of said neck of said container, said bead contacting the depending annular wall of said closure.

32. The stopper of claim 1 wherein said on-stop means is comprised of a lug (214) formed on the lower edge of said neck of said container and a mating lug (215) depending from a lower annular edge of said closure.

33. The stopper of claim 1 wherein said on-stop means is comprised of a vertically extending rectangular lug (216) formed on the lower edge inner wall of said closure and further comprising a mating lug (217) formed on the bottom neck of said container.

34. The stopper of claim 1 wherein said on-stop means is comprised of a blunt end of a thread (221) formed on the lower most portion of the inner wall of said closure and further comprising a mating thread stop (220) formed on the bottom neck of said container.

35. The stopper of claim 1 wherein said closure is further comprised of an inner cap (231) having a depending tamper indicating band and at least one outwardly extending annular bead (233) and further having an outer cap (230) fitting over said inner cap and having at least one mating annular bead (236).

36. A method of assembling a closure for a container, said closure having an inner cap and an outer cap, said inner cap having a tamper indicating band depending from a lower

annular edge therefrom, said method comprising:

placing said inner cap on said container;

snapping said outer cap over said inner cap after said inner cap has been fully placed onto said container;

wherein said inner cap has at least one outwardly extending retaining bead formed on a depending annular wall;

and further wherein said outer cap has at least one inwardly extending retaining bead formed on a depending annular wall such that after snapping said outer cap over said inner cap, said at least one bead on said outer cap is below said at least one bead on said inner cap thereby holding said outer cap in place.

37. A non-refillable one way stopper for containers, comprising:

a washer fit within the neck of a container;

a threaded pourer circumscribing and affixed to the upper end of said washer;

a one way valve (162) resting within pourer and vertically movable therein;

a retaining sleeve retained on said container and holding said washer and pourer in place;

a closure threadably retained on said pourer;

wherein said washer has an upwardly extending annular wall (164a) interior to said pourer and further wherein said one way valve (162) is comprised of an annular face circumscribed by a flat flexible annular surface (163a), said flat annular surface contacting said upwardly extending annular wall of said washer.

38. The one way stopper of claim 37 wherein said closure further comprises a downwardly extending stem (161) and said valve has a receptacle which receives said step

when said closure is threaded on said container, said stem applying downward pressure on said valve.

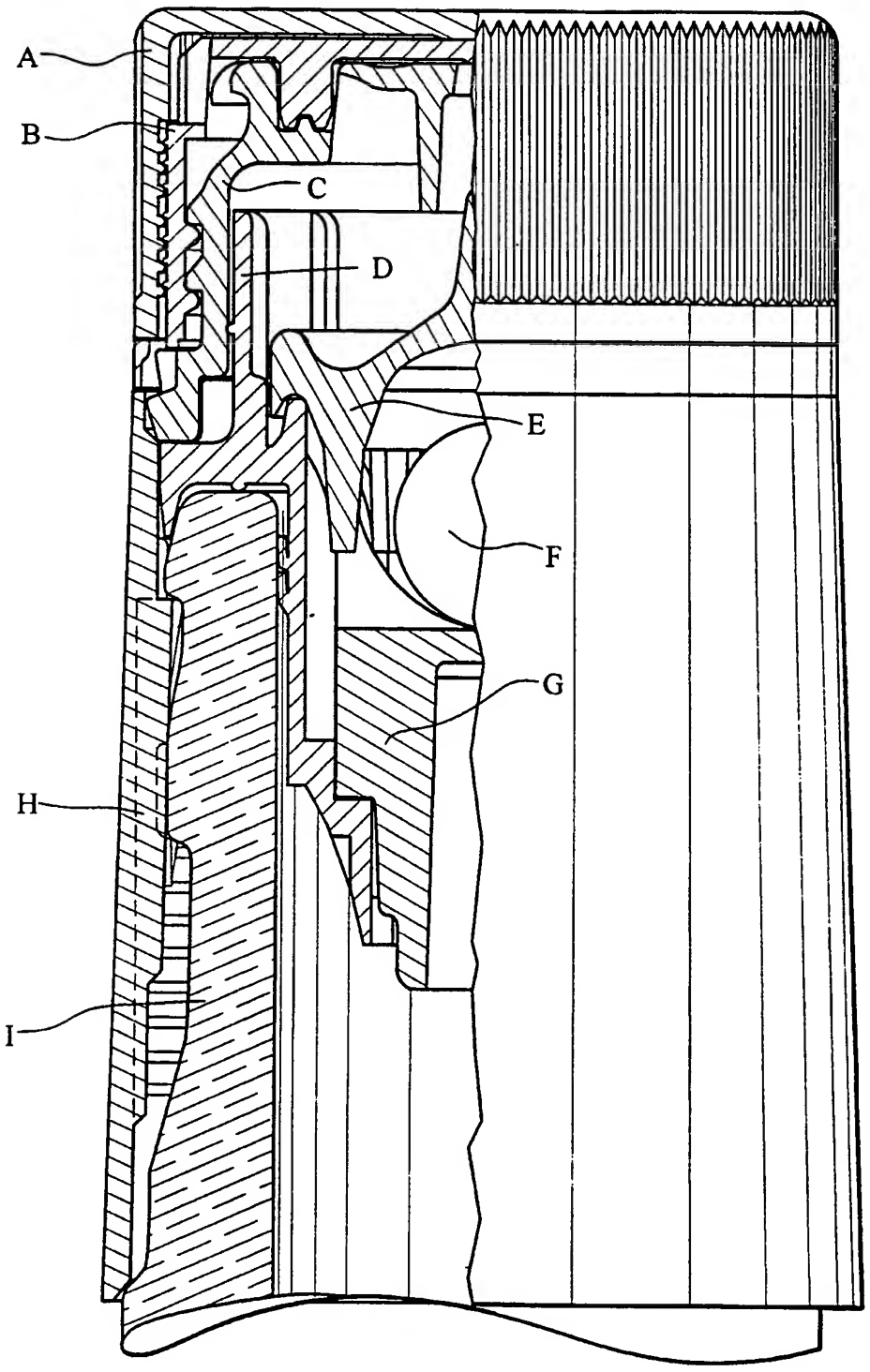

FIG. 1

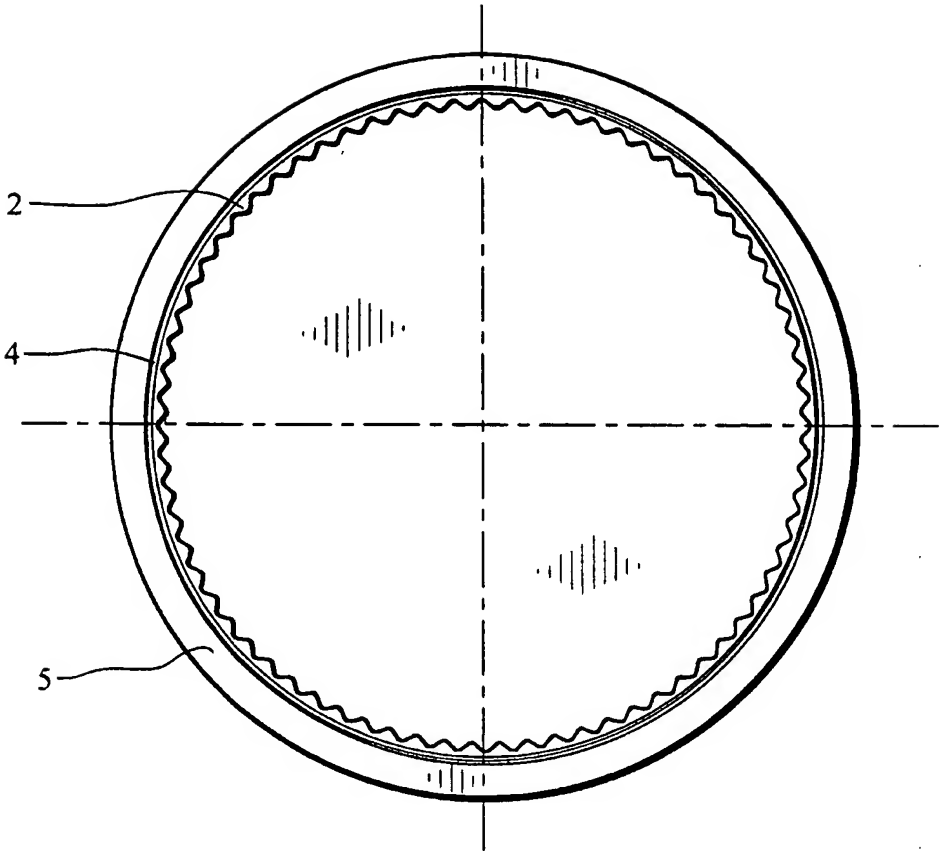

FIG. 2a

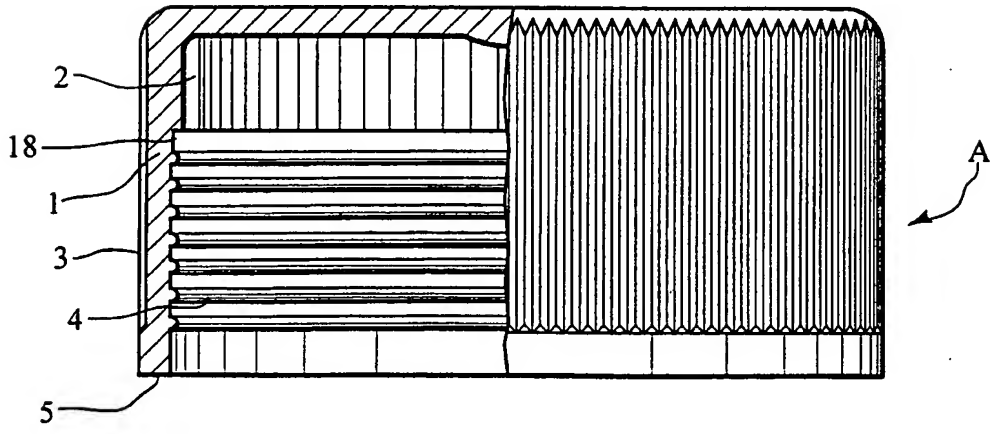

FIG. 2b

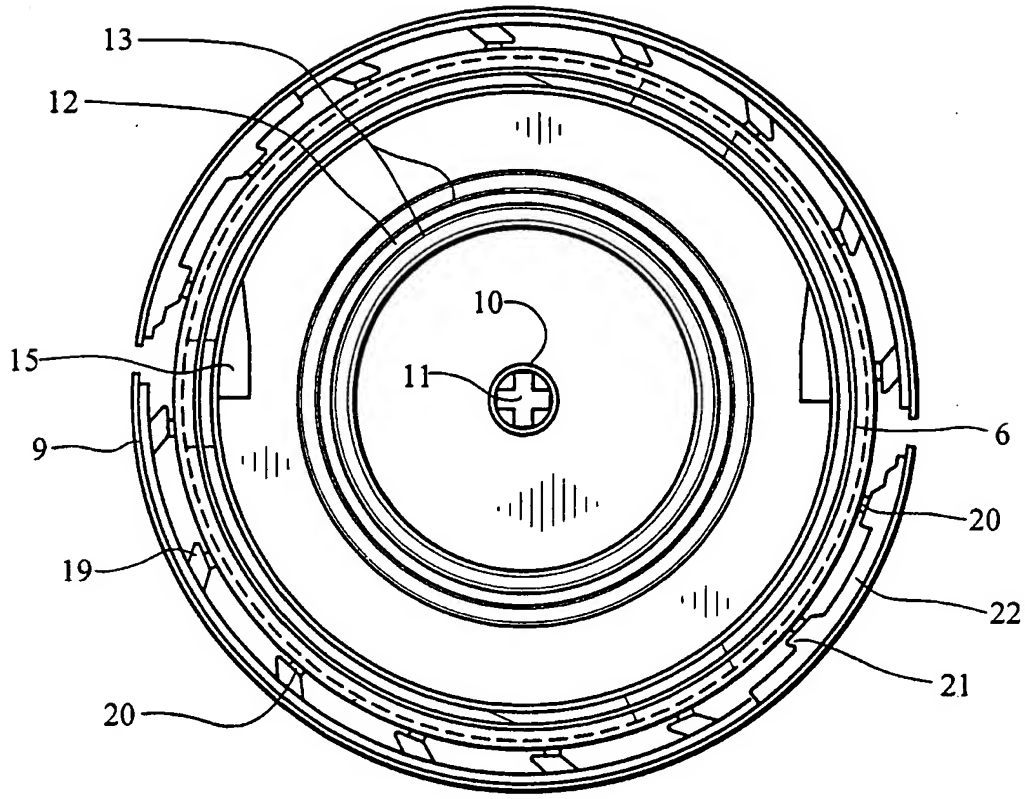

FIG. 3a

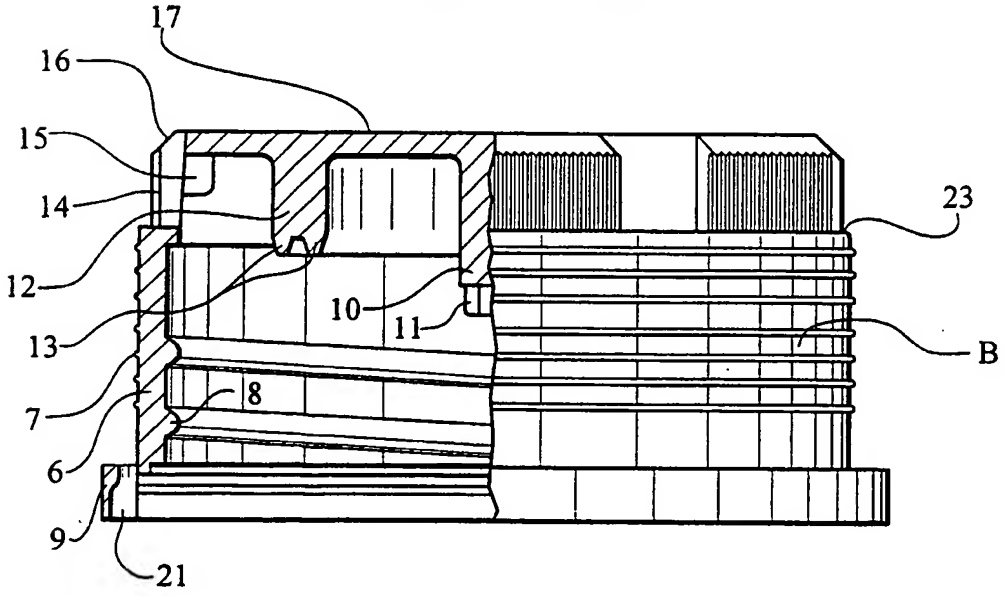

FIG. 3b

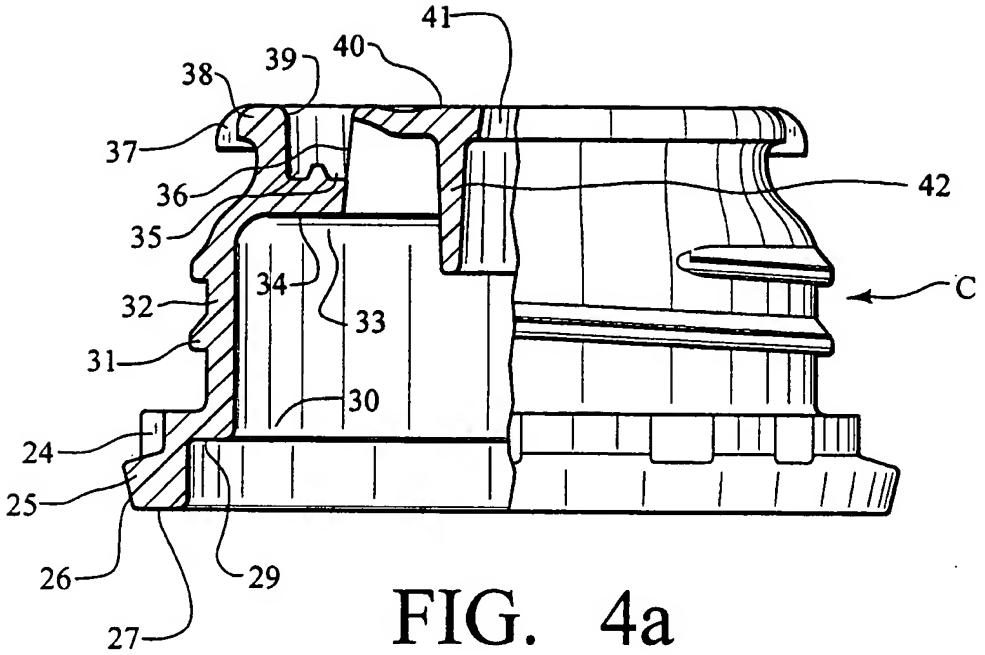

FIG. 4a

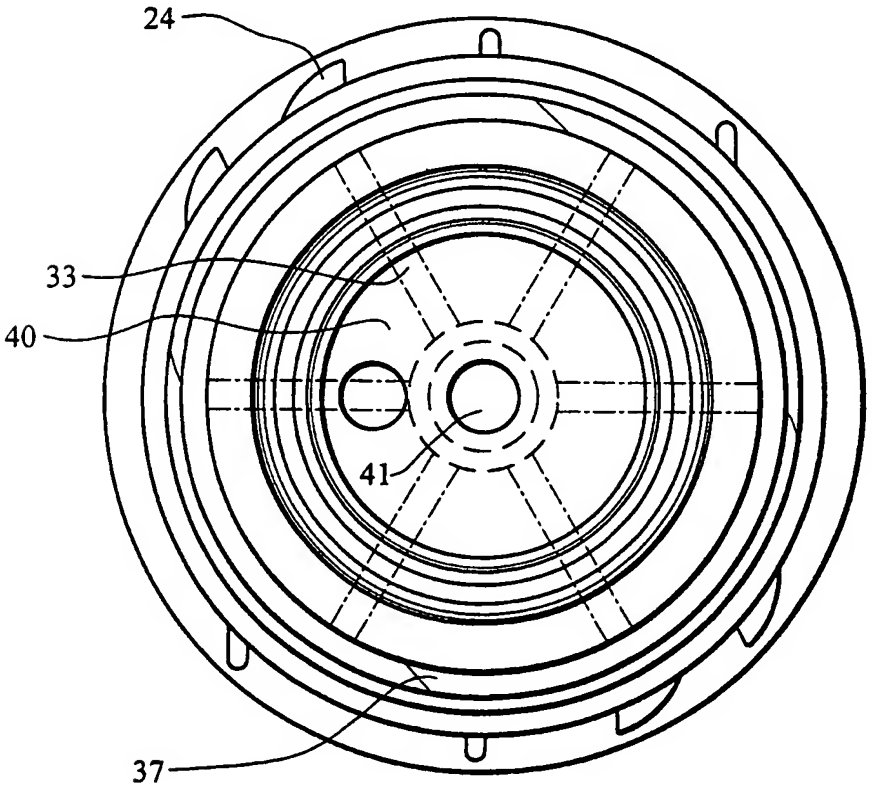

FIG. 4b

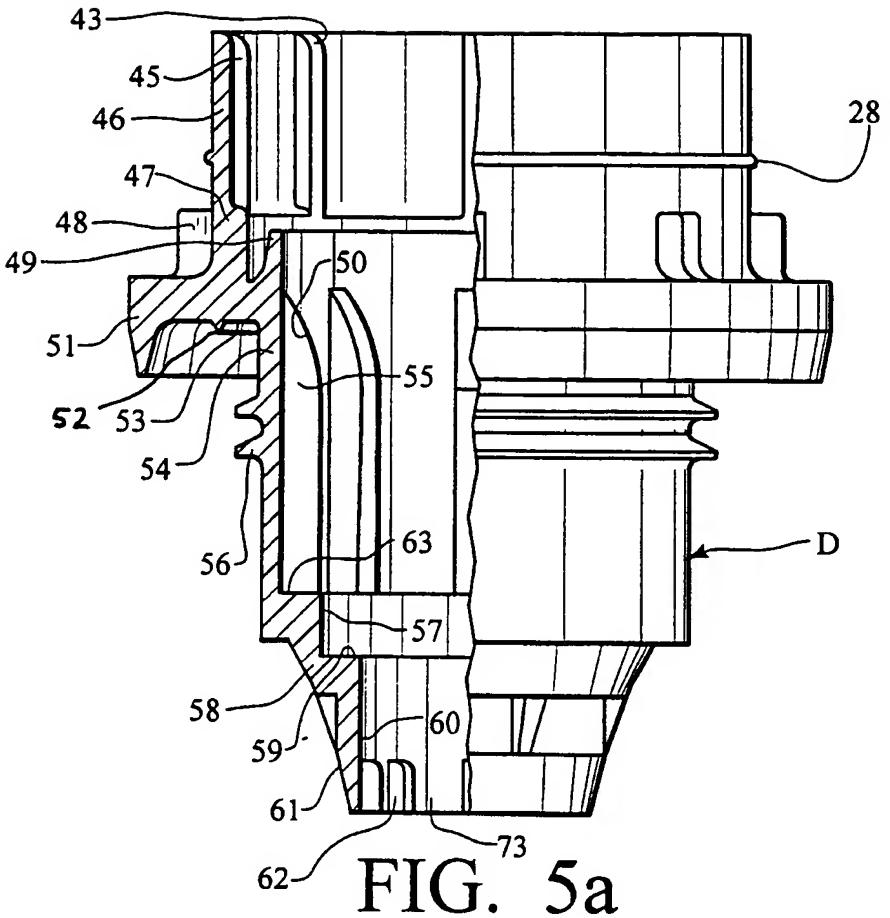
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FIG. 5a

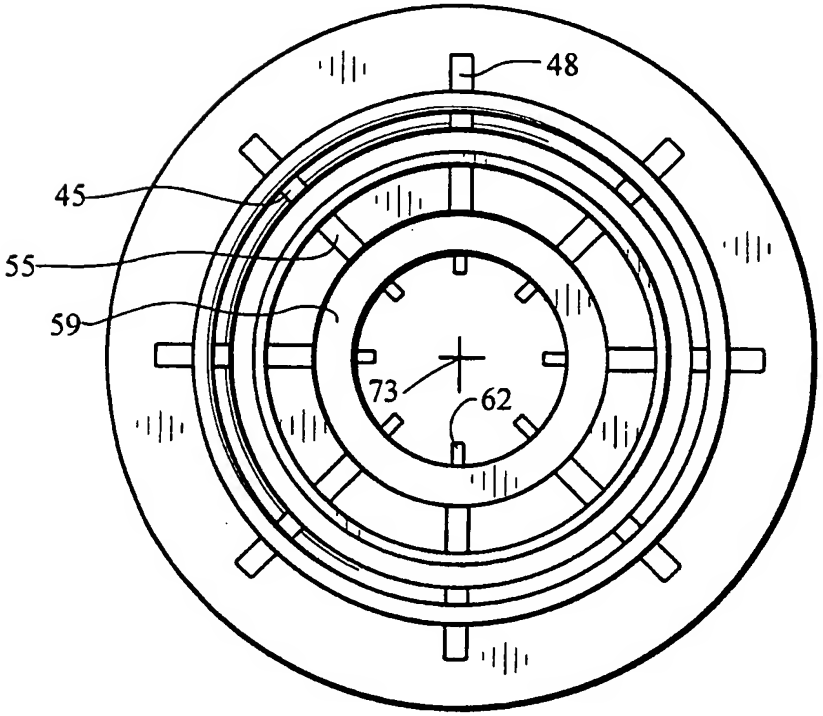
48
45
55
59
73
62

FIG. 5b

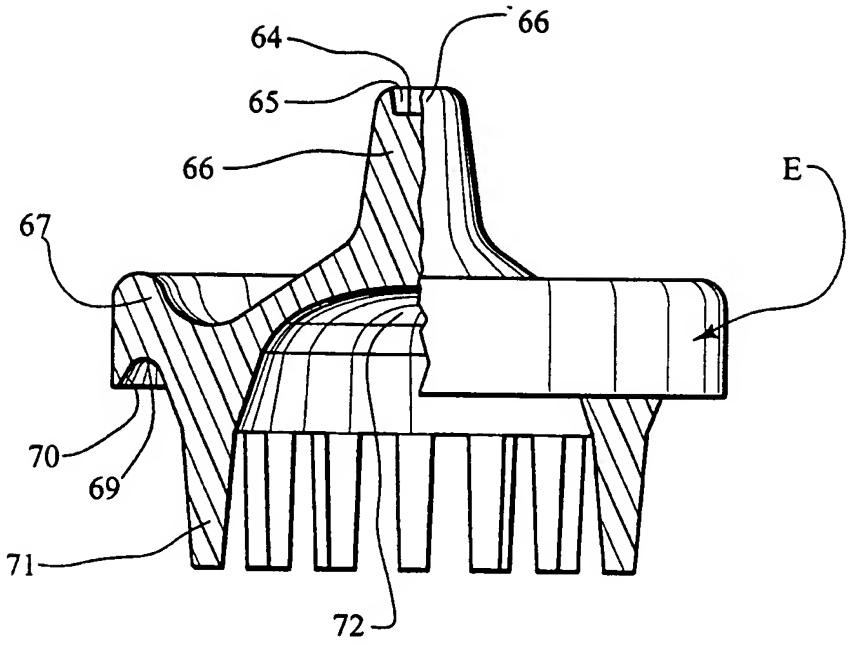

FIG. 6a

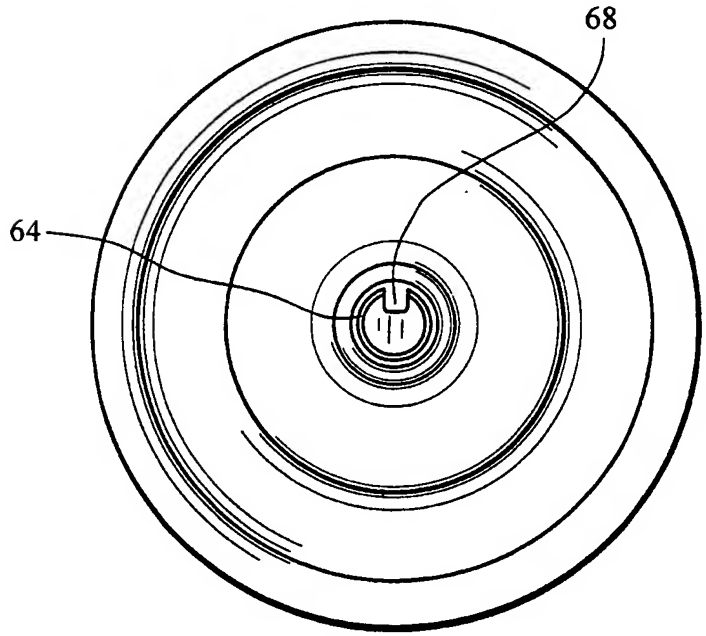

FIG. 6b

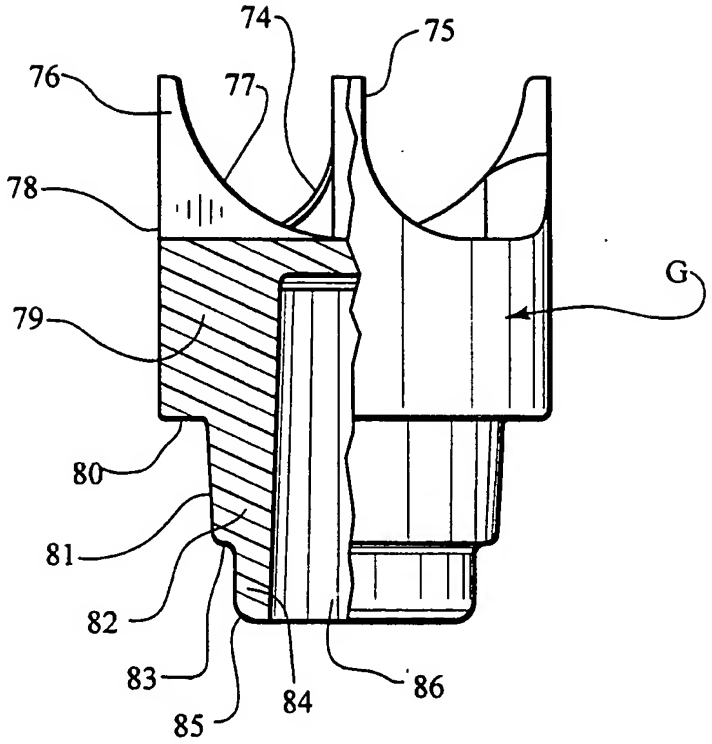

FIG. 7a

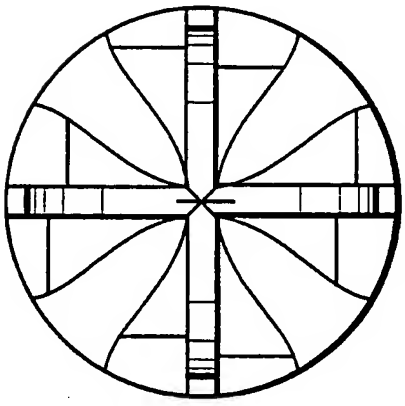

FIG. 7b

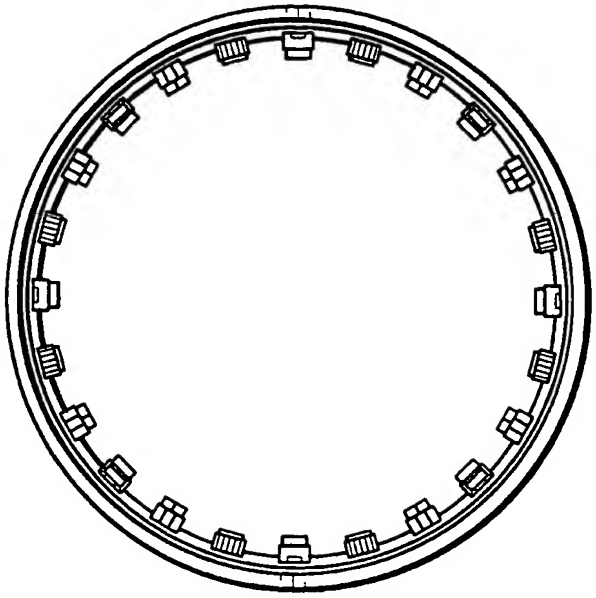

FIG. 8a

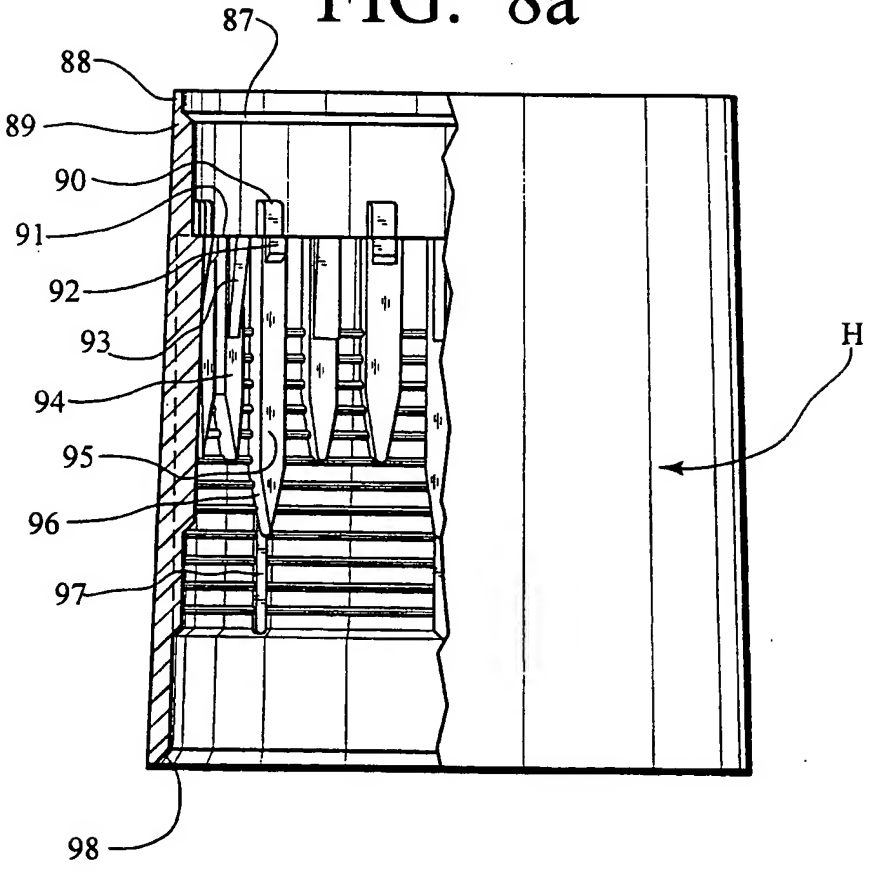

FIG. 8b

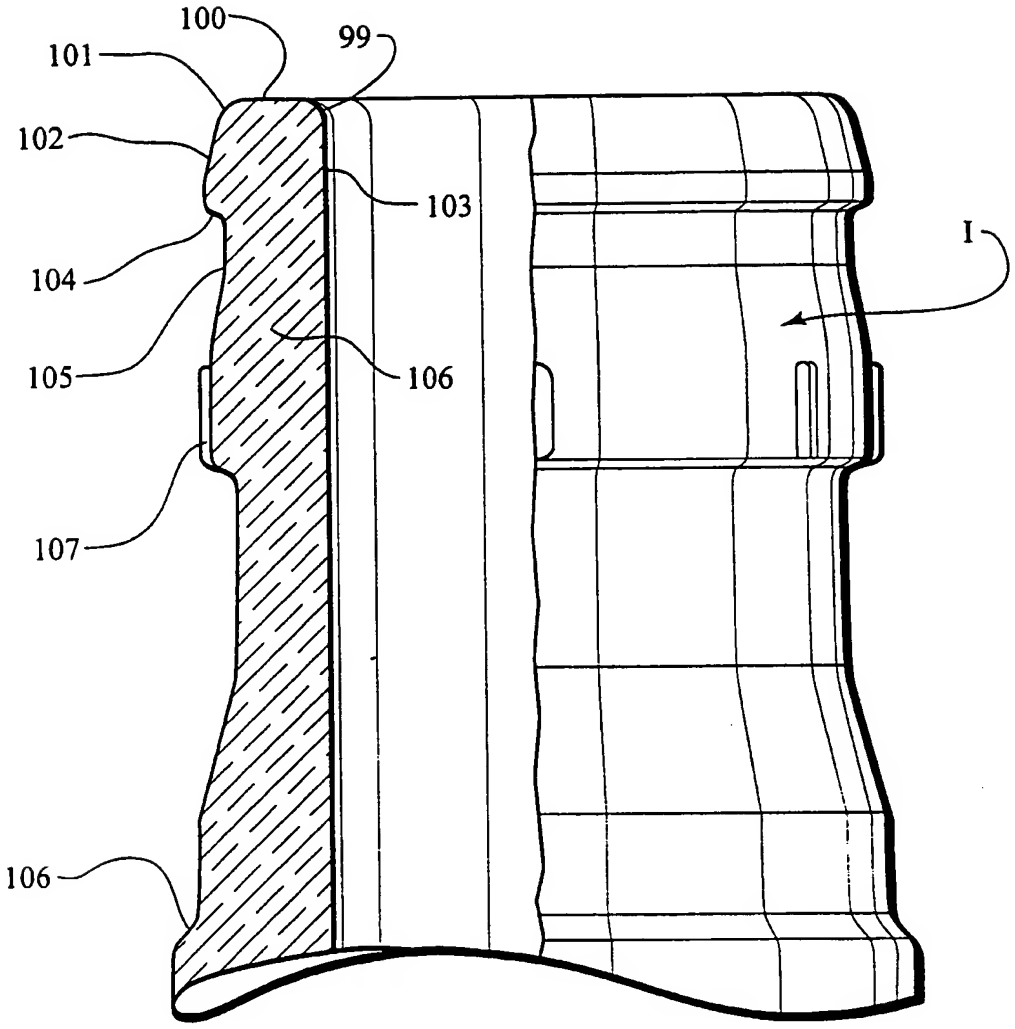

FIG. 9a

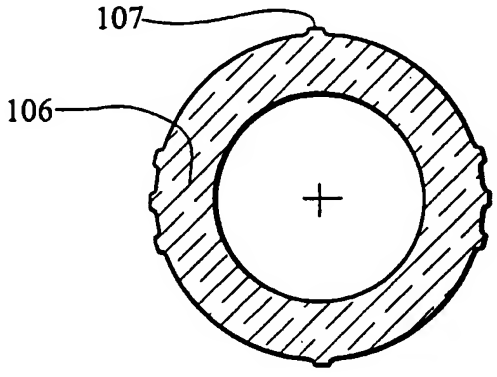

FIG. 9b

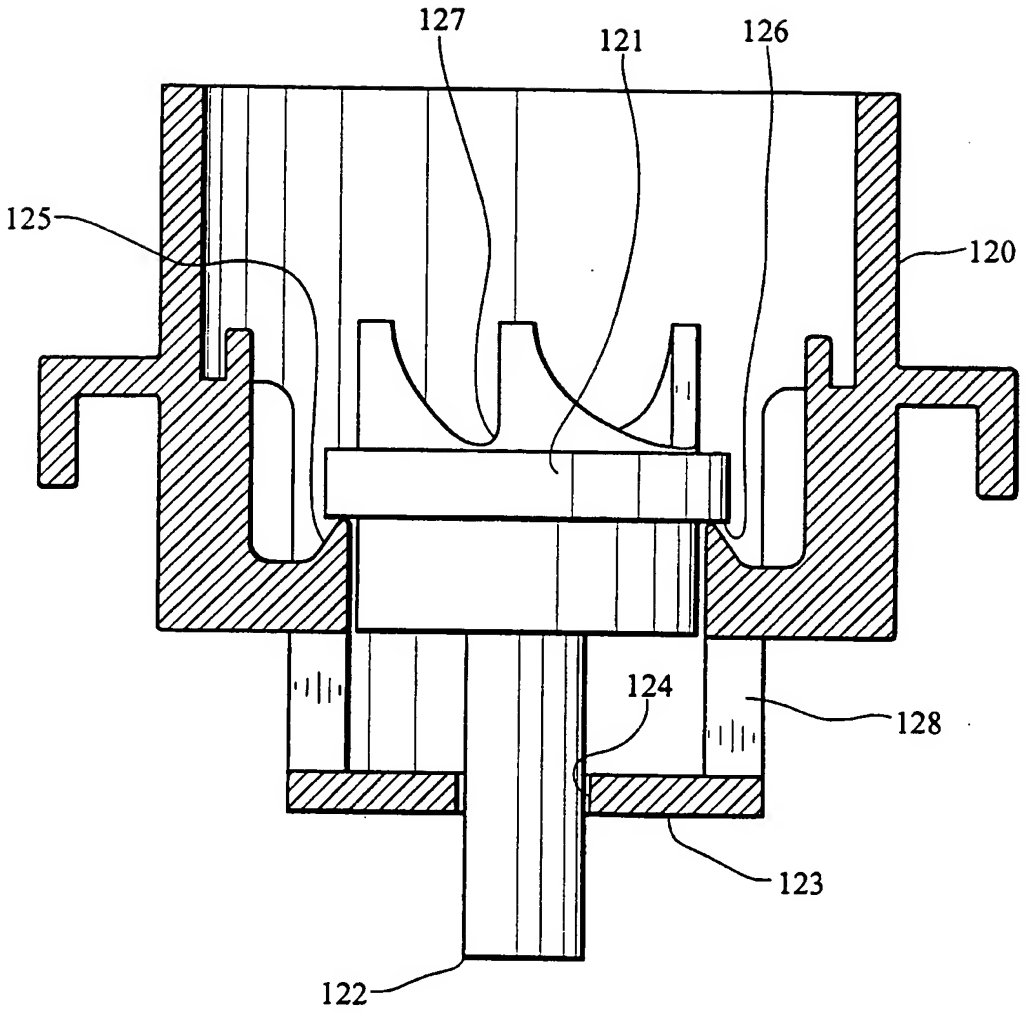

FIG. 10

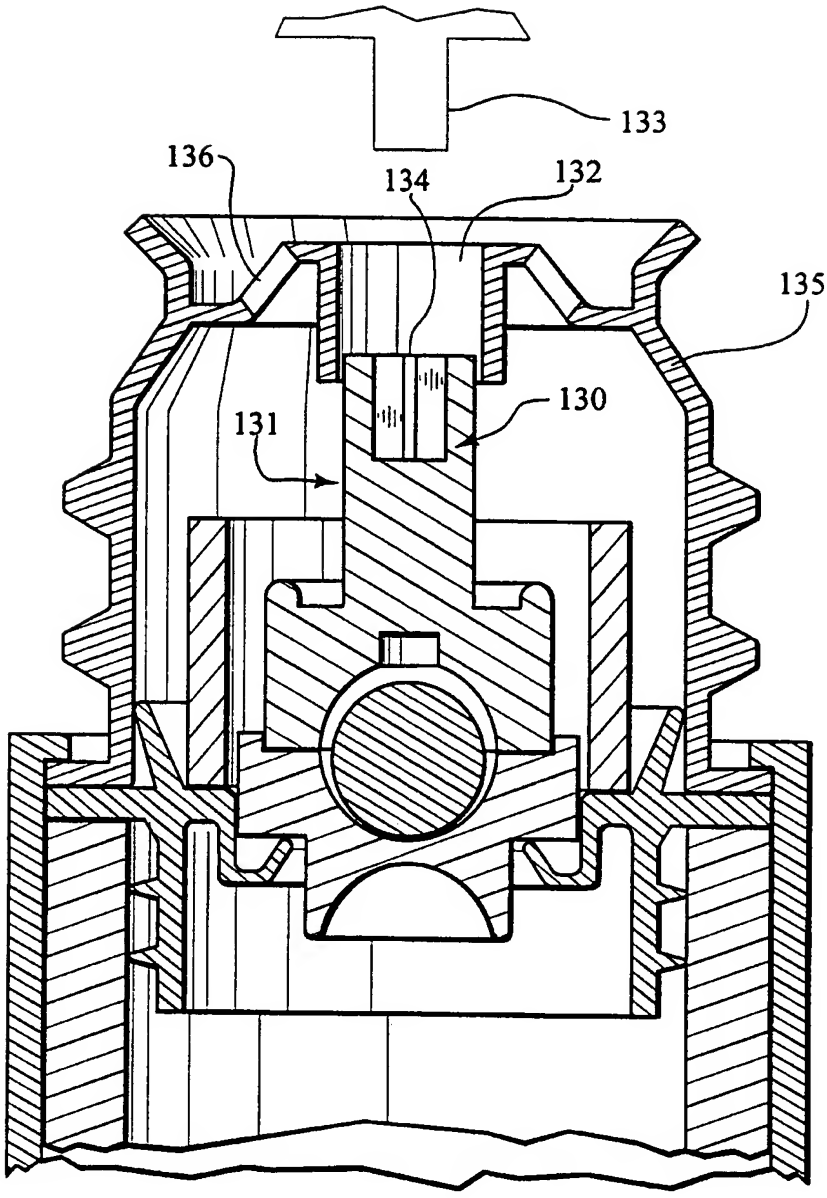

FIG. 11

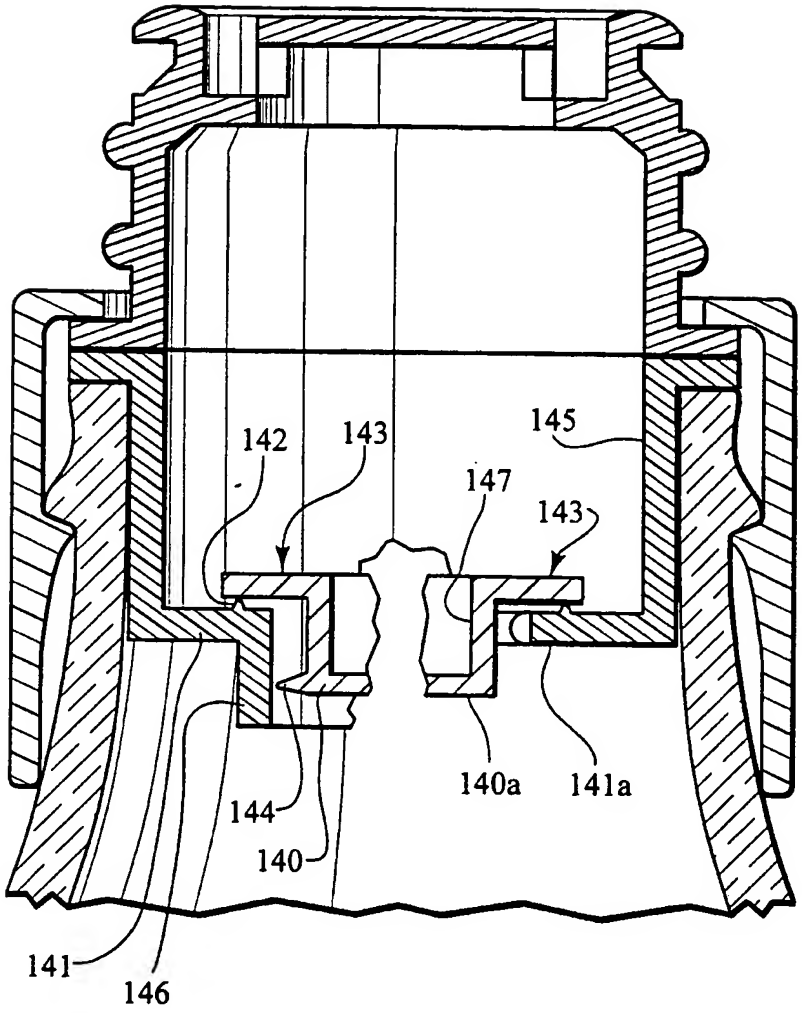

FIG. 12

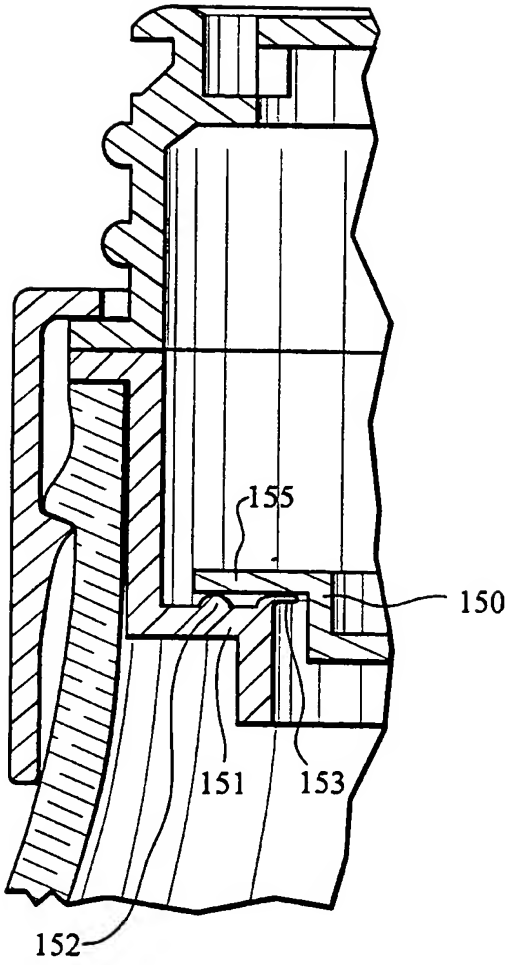

FIG. 13a

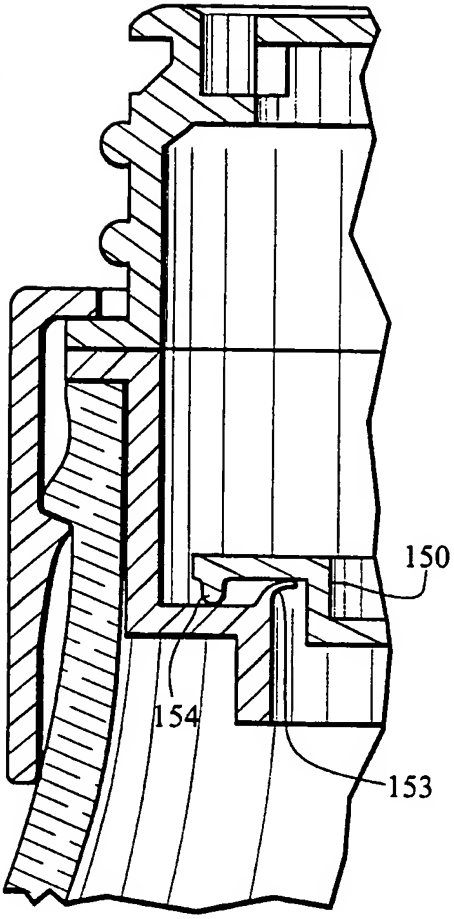

FIG. 13b

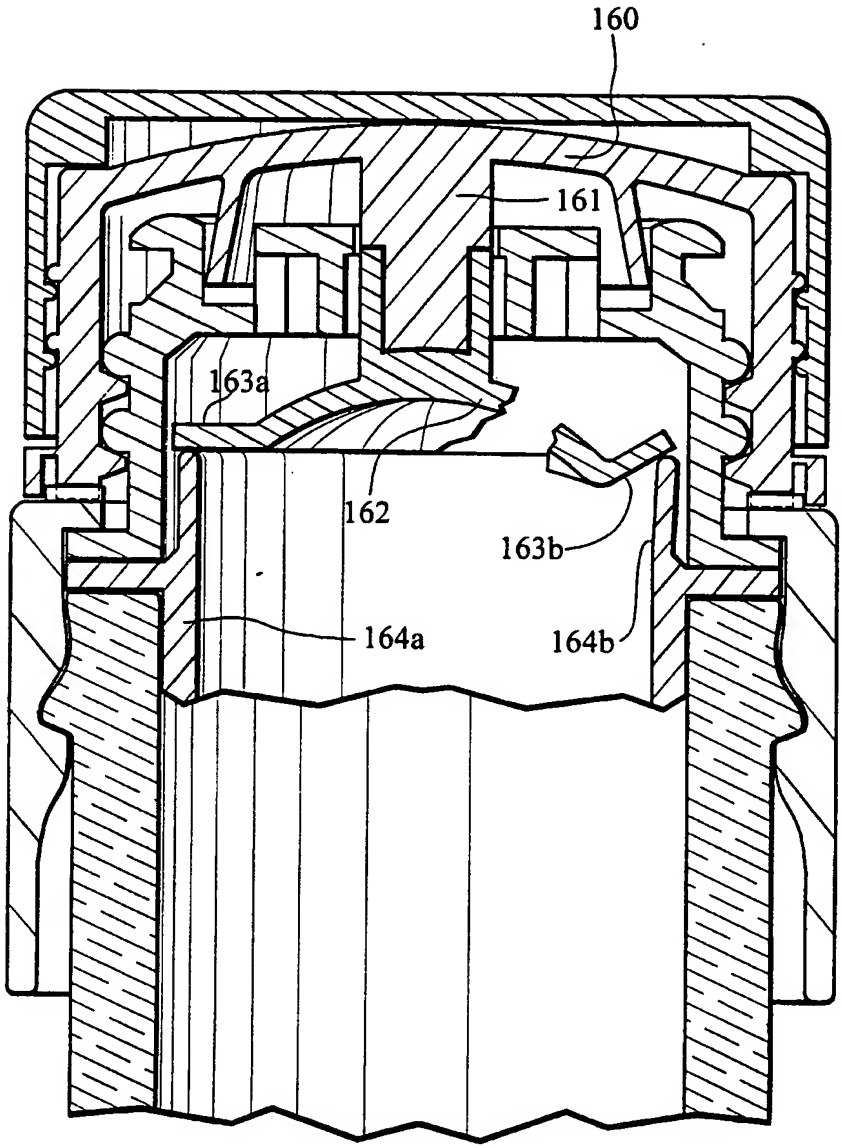

FIG. 14

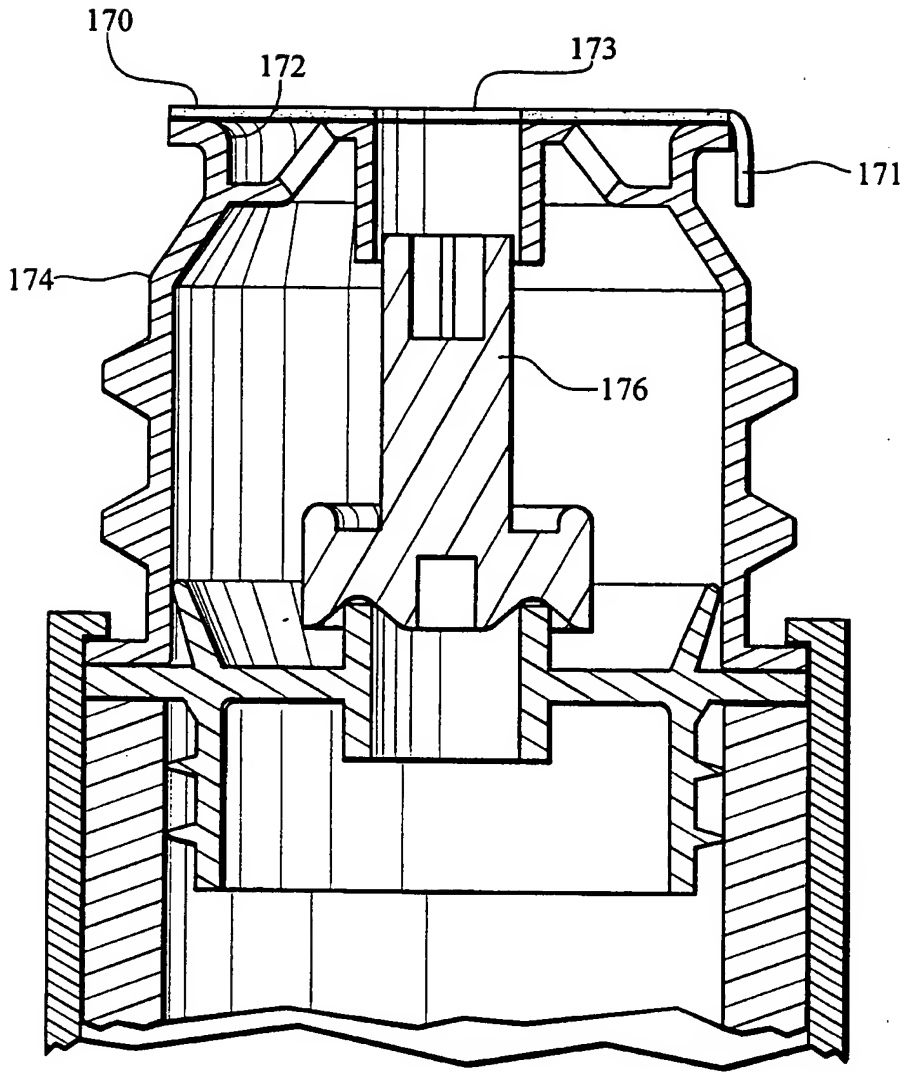

FIG. 15

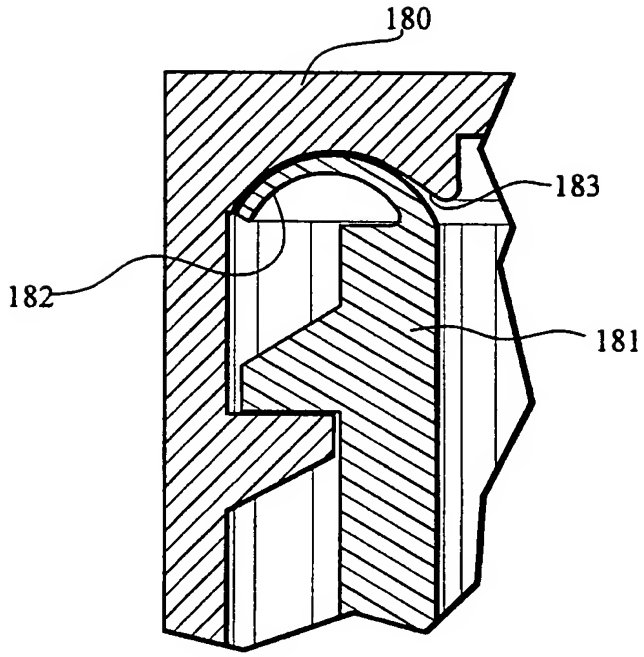

FIG. 16

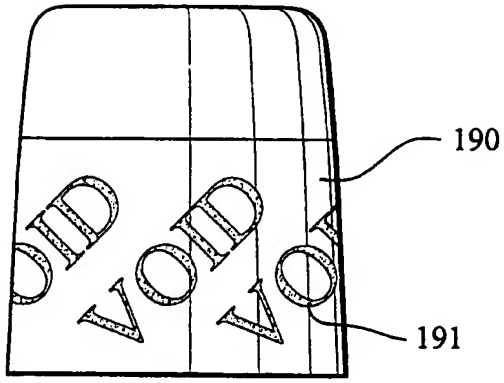

FIG. 17

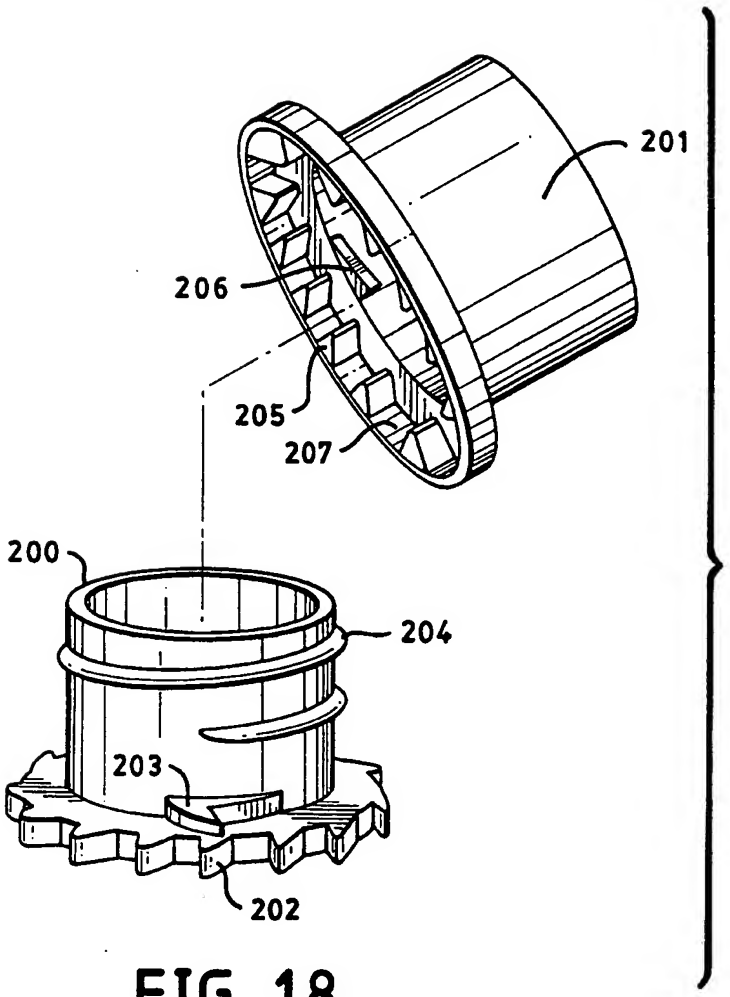

FIG. 18

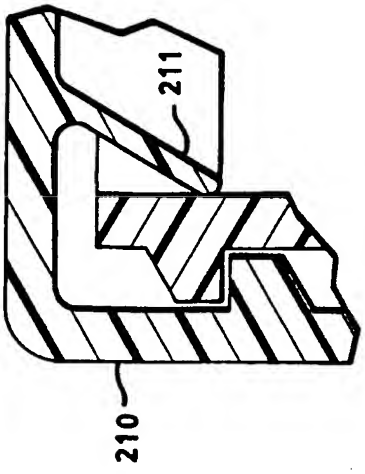

FIG. 19a

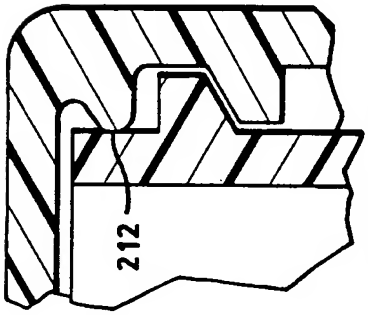

FIG. 19b

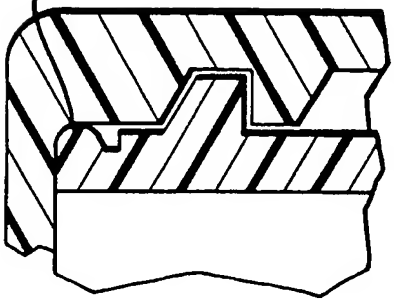

FIG. 19c

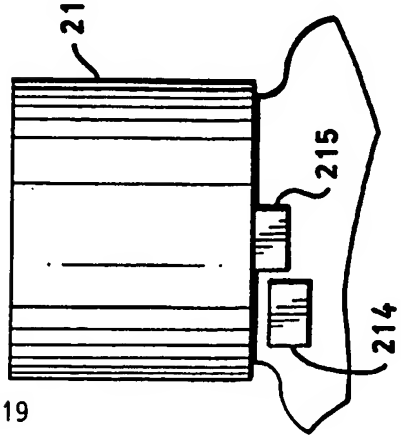

FIG. 19d

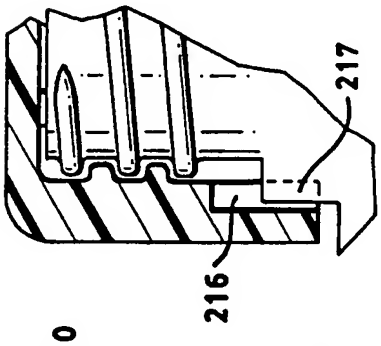

FIG. 19e

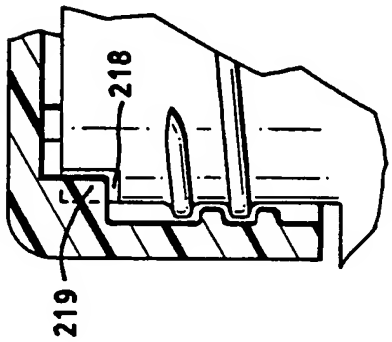

FIG. 19f

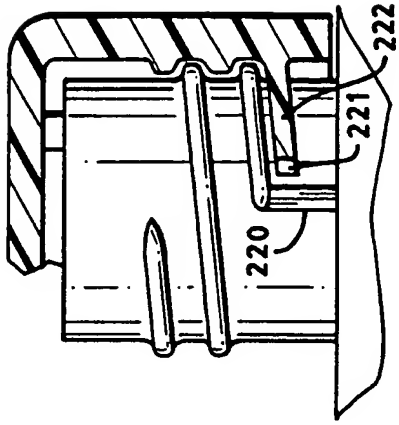

FIG. 19g

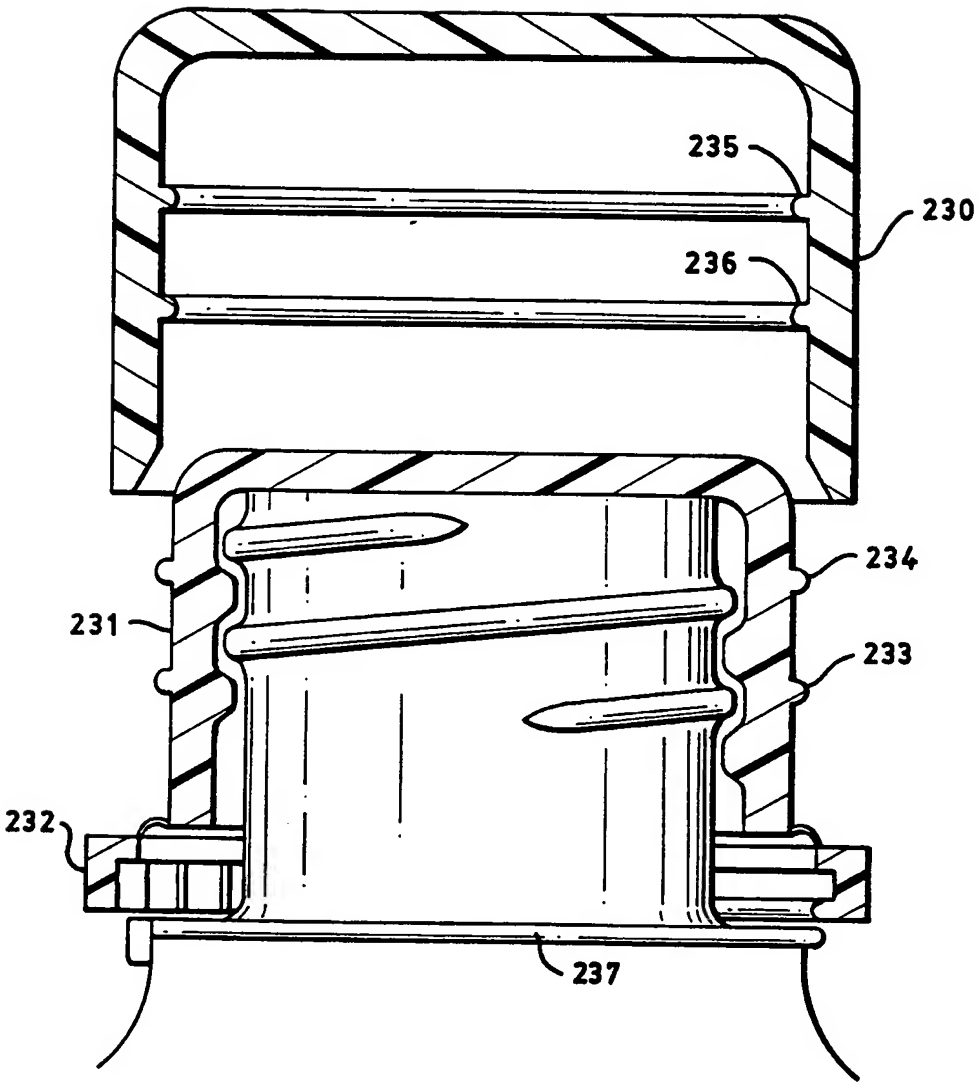

FIG. 20

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 99/01299

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D49/06 B65D49/10 B65D41/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 807 585 A (GRUPO STEVI) 19 November 1997 (1997-11-19) the whole document	1,16,17, 19,35
X		36-38

A	EP 0 706 952 A (GRUPO STEVI) 17 April 1996 (1996-04-17) the whole document	1,5-7,9, 10,19
X		37,38

A	WO 98 23495 A (GUALA CLOSURES) 4 June 1998 (1998-06-04) the whole document	1,5-7,9, 10,19
X		37,38

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 February 2000	14/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Gino, C

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 99/01299

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category '	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 06072 A (NIU, YUCONG) 20 February 1997 (1997-02-20) abstract; figures	1,5-7,9, 10,19, 35,36
X	---	37,38

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Ir ational Application No
PCT/IB 99/01299

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WO 9706072 A	20-02-1997	CN 2230286 U	03-07-1996
		AU 6654496 A	05-03-1997